MATERIALS BUREAU

TECHNICAL REPORT 88-4

AGGREGATE SOURCES OF REGION 3

MARCH, 1988

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NEW YORK STATE DEPARTMENT OF TRANSPORTATION
MARIO M. CUOMO, Governor
FRANKLIN E. WHITE, Commissioner

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AGGREGATE SOURCES OF REGION 3

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March 1988

MATERIALS BUREAU
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PREFACE

Each source of mineral aggregates for use in Materials Items is evaluated in terms of quality, uniformity and deleterious characteristics. This is accomplished through a program of testing, geologic evaluation and service monitoring. What we learn about each source from our sampling, testing and on-site inspections is fitted into a geologic framework that helps us avoid many problems and understand those that do occur.

This report summarizes the geology of the Region and its quarries. The sand and gravel sources are summarized as a historical tabulation. It is intended that the report will provide the Region with a one-source reference for most aggregate questions.

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GEOLOGY AND PHYSIOGRAPHY OF NEW YORK STATE

As an aid to understanding the geology of the aggregate-producing formations in New York State, it is helpful to review first the basic geology of the state as a whole. This is accomplished in the following by a brief discussion of the major geologic events associated with the rock formations that exist today, and a description of the prominent land masses in which the formations occur. In this connection, an abridged geologic time table is presented below to facilitate the discussion when reference is made to specific geologic time intervals.

GEOLOGIC TIME SCALE (ABRIDGED)*

Era	Period	Epoch	Approx. Age of Rocks Mill. of Yrs.
Cenozoic	Quaternary	Recent Pleistocene	0-1
	Tertiary	Pliocene Miocene Oligocene Eocene	1-60
Mesozoic	Cretaceous Jurassic Triassic		60-200
Paleozoic	Permian		200-600
	Carboniferous	Pennsylvanian Mississippian	
	Devonian Silurian Ordovician Cambrian		
Proterozoic Archeozoic	Precambrian		600-4,500

Fig. 1

* Modified from Krynine and Judd

Major Geologic Events

The historical geology of New York State is extremely complex and, at times, vague. The most ancient period is identified as the Precambrian which is estimated by geologists to have existed 600 million to 4.5 billion years ago. Sedimentation that occurred during this period is represented in New York by several areas containing rocks which are known to be at least one billion years old.

In the course of the millions of years that have followed, various conditions have prevailed, including major crustal movements, at times accompanied by uplift and intrusion of molten rock, which created mountains and other high lands; extensive erosion; inundation which deposited sediments that eventually consolidated, and consecutive cycles of glaciation. Each of these events contributed specific types of rocks or were responsible for the development of particular structural and topographic features, as will be discussed in the next section. For this report, these events have been given titles which describe their identifying characteristic and the time during which they occurred, for example, Precambrian uplift, Silurian sea, and Mesozoic erosion.

Physiographic Provinces

As a result of the geologic processes referred to above, New York State consists of a system of highlands and lowlands. These major land masses are generally referred to as physiographic provinces or regions. The boundaries that separate them are based principally on significant changes in elevation. Each province is distinctly different from those adjacent to it, having characteristic rock formations, structural features and topographic expression. The twelve provinces into which the state has been divided are outlined on Figure 2 and are described briefly below.

Adirondack Mountains - The Adirondacks comprise a nearly circular, partially mountainous upland in northern New York that occupies approximately one-fourth of the land area of the state. The rocks of the Adirondacks are Precambrian in age and consist of extensively folded igneous and metamorphic formations, granite, syenite and anorthosite being most abundant.

The Precambrian history of the Adirondacks extends over a considerable period of time. It is very complex and not well understood. The earliest sediments are believed to have been deposited in standing water and were subsequently consolidated into shales, sandstones and limestones. Miller* has suggested that one or more large scale igneous intrusions of these original sediments, contemporary or subsequent crustal movement, and a general uplifting of the area all took place during the Precambrian period, accounting in large part for the present nature of this extensively folded and metamorphosed region. There are, however, diverging theories regarding the geology of the Adirondacks which raise questions about the chronology and duration of the geologic events and the nature of the events themselves. Modern techniques of radio-active dating have established that the last period of metamorphism that altered the mineralogical nature of the Adirondack rocks occurred about one billion years ago.

Hudson Highlands - The Hudson Highlands occur as a rugged upland in southeastern New York. They are composed principally of igneous and metamorphosed sediments of Precambrian age with granites and gneiss predominating.

The geologic history of this region is quite similar to that of the Adirondacks, the major mountain-making disturbances responsible for their occurrence probably being part of the same event. The Hudson Highlands, however, have also been influenced by the disturbances of the Taconic and Appalachian revolutions which have resulted in their further alteration. The upland character of this part of New York is also the result of the erosion of adjacent and less resistant sediments during the Tertiary period.

Taconic Highlands - The upland area that rises east of the Hudson River and includes the eastern border of the state from Putnam County north to Lake Champlain is often referred to as the Taconic Highlands. These highlands are composed principally of strongly-folded schists, slates and phyllites.

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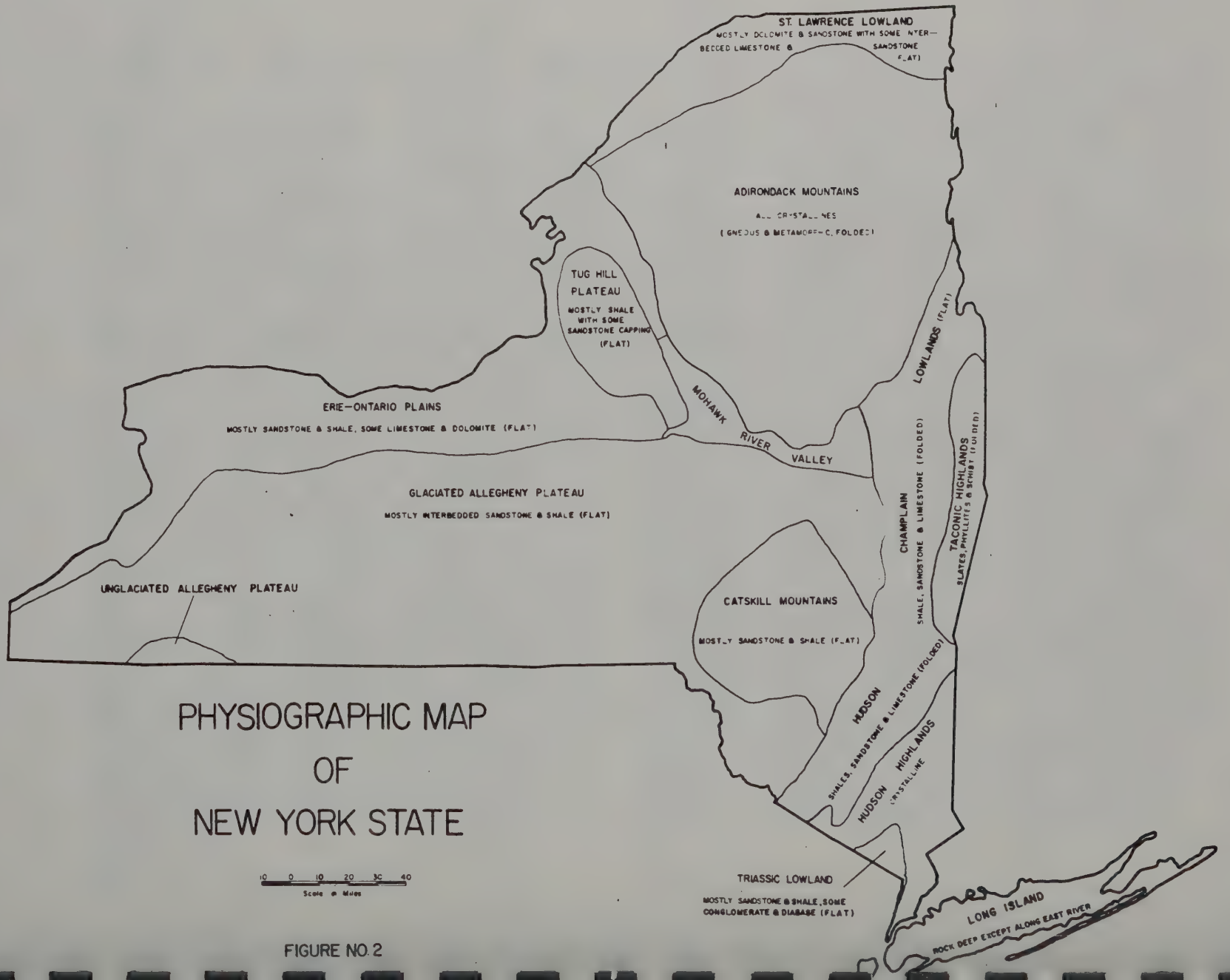
* Miller, W. J., "The Geological History of New York State", New York State Museum Bulletin 168, November 1924.



PHYSIOGRAPHIC MAP OF NEW YORK STATE

FIGURE NO. 2

The Taconic Revolution, which occurred near the end of the Ordovician period, is responsible for the folding, elevating, and metamorphosis of the Cambrian and Ordovician sediments that created the high land mass that now includes the Taconic Highlands. Like the Adirondacks and the Hudson Highlands, the Taconics were once much higher than they are today and extended somewhat further to the west, but extensive erosion during the intervening millions of years has considerably reduced their size. Much of the erosion took place during the Silurian and Devonian periods, contributing to the deep sediments of that age that now form the Catskills and the Allegheny Plateau. Again, like the Adirondacks and the Hudson Highlands, their present prominence is largely due to the removal of adjacent and weaker sediments during the period of Tertiary erosion.

Allegheny Plateau - This extensive upland occupies nearly one-third of the land area of New York and forms its largest single physiographic region. Included in this plateau is a small unglaciated portion in the southwestern corner of the state which is bounded roughly by the Allegheny River and is usually set apart as a distinct physiographic unit. In all other respects, however, this unglaciated portion is similar to the remainder of the plateau.

Very little is known about the early geologic history of the Allegheny Plateau owing to the great depth of its sediments. The region today is covered by deposits of Devonian age which occur to considerable depths and which consist predominantly of sandstone and shale. The strata are essentially flat-lying with a gentle dip to the south and southwest. The Devonian strata of the Allegheny Plateau are land-derived sediments washed into the Devonian Sea from the Taconic Mountains to the east and from land areas which are known to have existed further north in Canada. The present relief features are the result of extensive stream dissection that took place during the period of Tertiary erosion.

Catskill Mountains - The Catskill Mountains may be considered an easterly extension of the Allegheny Plateau. They consist of rocks of the same age (Devonian) and structure (horizontally bedded) and have nearly the same geologic history. The same elements that have caused erosion and dissection of the Plateau have similarly effected the Catskills. Due to the greater durability of the protective cap of coarse sandstone or conglomerate, the Catskills have a generally higher

elevation and a more rugged topography than that of the plateau further west.

Tug Hill Plateau - The Tug Hill Plateau is a highland mass of essentially flat-lying sediments, predominantly shales and sandstones of Ordovician age, capped by a resistant Silurian sandstone that is responsible for its present elevation. The plateau surface is smooth with moderate relief. It is an outlier of the Allegheny Plateau to the south, with which it shares a common geologic history.

Triassic Lowland - The Hudson Highlands of southeastern New York partially surround the northern extremity of a lowland which consists almost entirely of relatively weak sandstones and shales that dip gently to the west. The eastern edge of this lowland is bordered by an intrusive formation of diabase that has withstood weathering and erosion so that it now stands as a ridge forming the New Jersey Palisades of the Hudson River.

As a result of the Appalachian Revolution which occurred toward the end of the Paleozoic era, New York was raised well above sea level, and the young Appalachian Mountains were subjected to vigorous erosion. Accordingly, during the Triassic period, non-marine strata were deposited in a series of long troughlike depressions paralleling the main axis of the Appalachian range. The northern end of the largest of these depressions forms the Triassic Lowland region of New York. During the formation of these beds, considerable igneous activity occurred which intruded molten rock into and between the strata. Subsequent erosion of the adjacent weaker sandstones has left the igneous intrusions standing as conspicuous topographic features, the most noteworthy being that which forms the well known Palisades.

Hudson-Champlain Lowlands - The physiographic region referred to as the Hudson-Champlain Lowlands consists of a system of three interconnected lowlands extending in a northwest direction from the state line in southern Orange County to the true Hudson Valley between Cornwall and Kingston which it intersects and follows northward to the drainage divide above Glens Falls, continuing into the Champlain Valley.

Like all of the major drainage courses of New York, this valley system developed during the Tertiary period on the uplifted Cretaceous peneplain. At the end of the Mesozoic era, erosion had reduced the entire state to a flat featureless plain with sluggish drainage courses and meandering streams, much the same as the lower Mississippi of the present day. Due to the considerable thickness of unconsolidated sediments, the character of the underlying bedrock had no influence on the drainage courses. The uplifting of this plain at the close of the Mesozoic revitalized these streams and they began to cut channels through the deep alluvial and flood plain deposits into the underlying bedrock. Some of the larger streams that originated in the weakly consolidated sediments of the peneplain became such vigorous and effective erosive agents that when they reached the underlying rocks their course was so firmly established that the character and structure of the bedrock was not able to exert any influence on their course. The Hudson River was such a stream. The lower Hudson, following a course completely out of harmony with the structure and hardness of the underlying rocks, cut diagonally across many of the folds of the western Taconics. South of the Taconics, the river cut a deep gorge almost perpendicular to the axis of the structural folds of the hard crystalline rocks of the Hudson Highlands.

While the larger streams were cutting their valleys through hard and soft materials alike, the smaller, less hardy ones were guided by the major structural characteristics of the underlying bedrock formations. The Wallkill and several other tributaries of the Hudson cut their valleys in the weaker rock belts paralleling the northeast-southwest structural folds created in Orange County by the Appalachian Revolution. In this manner, the southernmost portion of the Hudson-Champlain Lowland system was formed. The Hudson-Champlain Lowland from about Glens Falls south lies on the eroded surface of extensively folded Silurian deposits which consist of limestone and shale, with some sandstone and slate.

The New York portion of the Champlain Valley is completely submerged, except for several small areas of horizontally bedded limestone that occur between the lake and the Adirondack Mountains, none of which are more than

several miles wide. The trough in which this valley occurs resulted from a down faulting of the beds. Drainage through this area commenced during the Tertiary period. The present Lake Champlain, however, is the result of extensive ice erosion during the Pleistocene and the subsequent accumulation of water.

Mohawk River Valley - The Mohawk Valley developed in a manner similar to the Hudson Valley that is, during the Tertiary period by cutting through the deep alluvial and flood plain sediments into the underlying bedrock. The present day Mohawk has established itself along a belt of weak Ordovician shales between the hard Precambrian rocks of the Adirondacks on the north, and the fairly resistant Helderberg limestones on the south. The Mohawk originally had its source near Little Falls. Another river flowed west from this point past Utica and Rome into the basin now occupied by Lake Ontario. However, the lake that was created in the Ontario basin during the retreat of the Pleistocene ice sheet discharged to the east through this valley system (before the St. Lawrence was cleared of ice) and over-rode the Little Falls divide, thus establishing the present Mohawk River.

St. Lawrence Lowland - The St. Lawrence Lowland is a smooth plain that lies directly north of the Adirondack Mountains and extends to the northern boundary of the state in this region. The lowland is underlain, for the most part, by Cambrian sandstones and Ordovician limestones and shales that dip gently to the northwest. In the Thousand Islands area, Precambrian crystallines appear at the surface and form the Frontenac Arch which separates this lowland from the Erie-Ontario Plains. The St. Lawrence River, which is the main drainage course of the Lowland, originated during the Tertiary period. Its source is believed to have originated at the divide formed by the hard crystallines of the Thousand Islands area. The relatively recent formation of Lake Ontario and the downwarping of the land has allowed the drainage to pass over this divide.

Erie-Ontario Plain - The Erie-Ontario Plain of New York consists of a belt of relatively low relief bordering these two lakes and sloping gently toward them from the Allegheny and Tug Hill Plateaus. The area is underlain by sandstones, shales and limestones of Ordovician, Silurian and Devonian ages that dip slightly to the west and southwest.

This plain is the non-submerged portion of the basins presently occupied by Lakes Erie and Ontario. The basins originated as drainage channels cut into the softer sedimentary beds during the Tertiary period. Subsequent erosion by glacial ice and downwarping of the earth's crust has resulted in their present character.

Long Island - Except for a few exposures of sands and gravels deposited during a period of marine conditions that prevailed in southeastern New York during the Creteous period, the surface materials of Long Island consist of glacially-deposited sediments of the Pleistocene period. The dominant topographic feature of the Island is a plain that occupies its entire length, sloping from an elevation of about 200 feet at the north shore to the ocean on the south. The plain is interrupted by two roughly parallel systems of terminal moraines.

BEDROCK GEOLOGY OF REGION 3

Ordovician Rocks - 425-450 Million Years Old

The oldest rocks exposed in Region 3 are of Ordovician age and include the Pulaski and Frankfort Formations of the Lorraine Group, the Queenston and Oswego Formations, and the Grimsby Formation of the Medina Group. All these rocks are sandstones or shales and are not quarried for aggregates. They do occur, however, in the sand and gravel deposits in the region and are important constituents in Oswego County.

Silurian Rocks - 400-425 Million Years Old

The Niagara Series of rocks include the Clinton Group and the Lockport Formation and are the oldest of the Silurian rocks. The Clinton Group is mostly shales with some limestone and sandstone but does not constitute an economic resource. The Lockport Formation overlies the Clinton Group.

Lockport Formation

This formation was named for its occurrence at Lockport in Niagara County, but a narrow outcrop extends across the state from Niagara Falls to Oneida County. Its thickness increases from a few feet at its eastern extremity to about 150 feet in Niagara County. Within Region 3 the Oak Orchard, Penfield, and Decew members are exposed.

Oak Orchard Dolomite is brownish gray, medium crystalline (saccharoidal), medium to thick bedded and is quite pure, that is, very low in insoluble residue. At Sodus it appears to grade directly into the underlying Rochester Shale but to the west the Oak Orchard overlies the Penfield and Decew members. The Penfield Member is characterized by crinoid fragments and a high percentage of quartz sand. In fact, the lower section of the Penfield is actually a dolomitic sandstone having greater than 50% quartz sand. The rock is gray to brownish gray, medium grained thin bedded to massive and vuggy, often containing gypsum.

The Decew is an olive-gray to brownish gray, fine to medium grained, argillaceous, siliceous, dolomite. The stone tends to be frost sensitive and is unsuitable for use as aggregate. The Lockport, in general, often contains coral reefs that are more or less porous and when not filled with secondary mineralization, form a rock that is structurally weak.

In Region 3 the Lockport dolomite is found in quarries 3-5R, 3-7R, and 3-8R.

Overlying the Niagara Series is the Cayuga Group that includes mostly, shales and argillaceous dolomites. The lower portion of the Cayuga contains the Salina Beds, the basal 700 to 800 feet of which is the Vernon or Camillus shale. Overlying the shale are the argillaceous dolomites of the Bertie Formation. None of the lower Cayugan rocks are quarried for "State" use.

The uppermost rocks in the Cayuga Group are the Cobleskill and Rondout formations.

Cobleskill Formation

The Cobleskill is a dolomite that is brownish gray, fine to medium crystalline and massive. It is suitable for aggregate use only in the western portions of the Region, otherwise it may be used in Soils items.

Rondout Formation

The Rondout overlies the Cobleskill throughout most of the Region. The erosional surface at the Oriskany Sandstone accounts for the disappearance of the Rondout between Seneca Falls and Oaks Corners. Throughout, the Rondout is an argillaceous, clay-rich, dolomite that has layers that are tan to brown, soft, laminated and very sorption and freeze-thaw sensitive, alternating with blue-gray, laminated, layers that are somewhat more sound than the tan. The Rondout is generally a "commercially" used aggregate or may be included in Soils items. It has no place in pavement items. It is exposed in 3-1R, 3-2R, and 3-4R.

Devonian Rocks - 350-400 Million Years Old

Manlius Formation

The Manlius Formation is the basal Devonian rock in Region 3. It is further subdivided into six members:

Bishops Brook Limestone
Jamesville Limestone
Clark Reservation Limestone
Elmwood Dolomite
Olney Limestone
Thacher Limestone and Dolomite

The Thacher Member directly overlies the Rondout and at times the lower part of the Thacher has been assigned to the Rondout. Within the Thacher is a layer, measuring approximately 3 feet thick, composed of argillaceous dolomite of the poorest grade. This argillaceous dolomite is a tan, laminated, soft stone with a dull, earthy luster and is referred to as the "OD" bed. Experience has taught us that we must exclude the "OD" from any pavement aggregate use. The Thacher overlying the "OD" is a limestone having thin to medium irregular beds and which weathers to a mottled appearance referred to as "drab and blue".

The Olney differs little from the underlying Thacher, and the preceding description of the limestone might nearly be applied to the Olney. The only readily seen difference between the two is in bedding thickness, the Olney having the thicker beds. The Olney also contains some distinctive stromotoporoid (cabbage-head) fossils. The Olney is exposed in 3-1R and 3-2R.

The Elmwood Member is worthy of some discussion because it is an argillaceous dolomite (clay-rich) and is therefore sorption sensitive and tends to deteriorate under freezing and thawing. Any ledge containing the Elmwood cannot be used for portland cement concrete aggregate for this reason. The Elmwood is

further divided into A, B, and C units. Units A and C are tan in color and Unit B is gray. This color alternation gives the Elmwood the "RR track" appearance that makes it easily distinguishable in a quarry face. The tan color make it easy to recognize stockpile contamination. The Elmwood is exposed in 3-1R, 3-2R and 3-3R.

Overlying the Elmwood is the Clark Reservation Member. Generally about 4 feet thick, it is a rather pure limestone having an oolitic structure seen only in weathered exposures. It has been quarried for "kiln stone" by Allied Chemical along with the two overlying units because of its chemical purity. It is exposed in 3-2R and 3-3R.

The Jamesville Member of the Manlius is similar in the purity of its limestone to the Clark Reservation upon which it rests. Although it is a monotonous gray, medium bedded lithology in general, it often contains well developed colonies of stromotoporoid (cabbage-head) fossils. The Jamesville is exposed at 3-2R, 3-3R, and 3-9R.

The Bishops Brook Member occurs only within a limited area in eastern Onondaga County and is no more than three feet thick. It is a fairly pure limestone but, in appearance, is reminiscent of an argillaceous dolomite with its tan weathering color. Its only active quarry exposure is at 3-3R where it had been quarried, along with the Jamesville and Clark Reservation Members, for "kiln stone" by Allied Chemical.

At the top of the Manlius Formation is an ancient erosional surface. We find, as we travel west through the Region, that many of the rock units described above have been eroded away. In the westernmost exposures all the Manlius and Rondout Formations are lost. It must be kept in mind that, like any erosional surface, this one is very irregular. The first deposition onto this surface was quartz sand.

Oriskany Formation

Oriskany Sandstone developed from this quartz sand and, as might be expected, varies radically in thickness. Within the Region the best exposure is at 3-9R

in Skaneateles. Here the sandstone can be readily divided into three units: A, B, and C. Units A and C are typically light colored to white medium grained sandstone having siliceous as well as calcareous cement between grains. Unit B is dark gray, poorly cemented and contains nodules of sand having a hard phosphatic cement. Phosphatic nodules are also found in the lower portion of the top unit, Unit C. Oriskany Sandstone is used as the friction component in limestone top course mixes. The Oriskany is exposed at 3-1R, 3-2R, 3-3R, 3-4R, and 3-9R.

Onondaga Formation

The Onondaga Formation consists of limestones sandwiched between the Oriskany Sandstone below and the Marcellus shales above. This formation has been divided into five members within the Region:

Seneca
Moorehouse
Nedrow
Clarence
Edgecliff

The Edgecliff lies on top of the Oriskany and its lower portion is often loaded with quartz sand. This sandy (arenaceous) Edgecliff is sometimes referred to as the Springvale Sandstone.

In general, the Edgecliff is a light to medium light gray limestone, distinctly crystalline and very fossiliferous. The fossils are best displayed in weathered rock and show abundant corals and crinoid fragments. A characteristic bluish or light gray chert is often associated with the Edgecliff. The Edgecliff is exposed at 3-1R, 3-2R, 3-3R, 3-4R, 3-9R, and 3-10R.

The Clarence Member overlies the Edgecliff in the western portion of the Region only. It is limestone characterized by an unusually high chert content. Eastward the chertiness diminishes, as does the shaliness of the overlying Nedrow Member, so that a rather homogeneous, moderately cherty limestone overlies the Edgecliff in Onondaga County. In spite of the fact that its shaly, argillaceous character is generally absent in Onondaga County, the limestone

lying between the Edgecliff and the Moorehouse is still referred to as Nedrow. The shaly Nedrow in Seneca County is not acceptable for use in Portland Cement Concrete. The Clarence and shaly Nedrow is exposed in 3-4R. The non-shaly Nedrow is exposed in 3-1R, 3-2R, 3-3R, 3-9R, and 3-10R.

The Moorehouse Member overlies the Nedrow and is a moderately cherty, medium dark gray limestone of good quality. More aggregate is produced from this member than any other in Region 3. It is exposed in 3-1R, 3-2R, 3-3R, 3-4R, 3-9R, 3-10R, and 3-11R.

Between the Moorehouse and Seneca Members of the Onondaga is a layer of volcanic ash called the Tioga Bentonite. It is about 3 to 10 inches in thickness and is a clay-like material that constitutes a minor nuisance to the quarryman. It is exposed in 3-3R, 3-4R, 3-9R, 3-10R, and 3-11R.

The Seneca Member is very similar to the Moorehouse and, in fact, the two would probably not have been separated if it were not for the presence of the Tioga Bentonite. The Seneca is exposed in 3-3R, 3-4R, 3-9R, 3-10R, and 3-11R.

Marcellus Formation

Overlying the Onondaga Formation is the Marcellus Formation of the Hamilton Group. Only two members of the Marcellus are of interest here: Union Springs Shale and Cherry Valley Limestone.

The Union Springs Member directly overlies the Seneca Member of the Onondaga and the two have a sharp to semi-gradational contact. This shale is black and fissile and must be excluded from all aggregate production. The Union Springs is exposed at 3-3R, 3-4R, and 3-11R.

The Cherry Valley Member is a thin limestone unit sandwiched between the Union Springs and Chittenango shales. It is more a curiosity than an economically important bed. Large cephalopod fossils are typical to this limestone. The Cherry Valley is exposed in 3-3R and 3-4R.

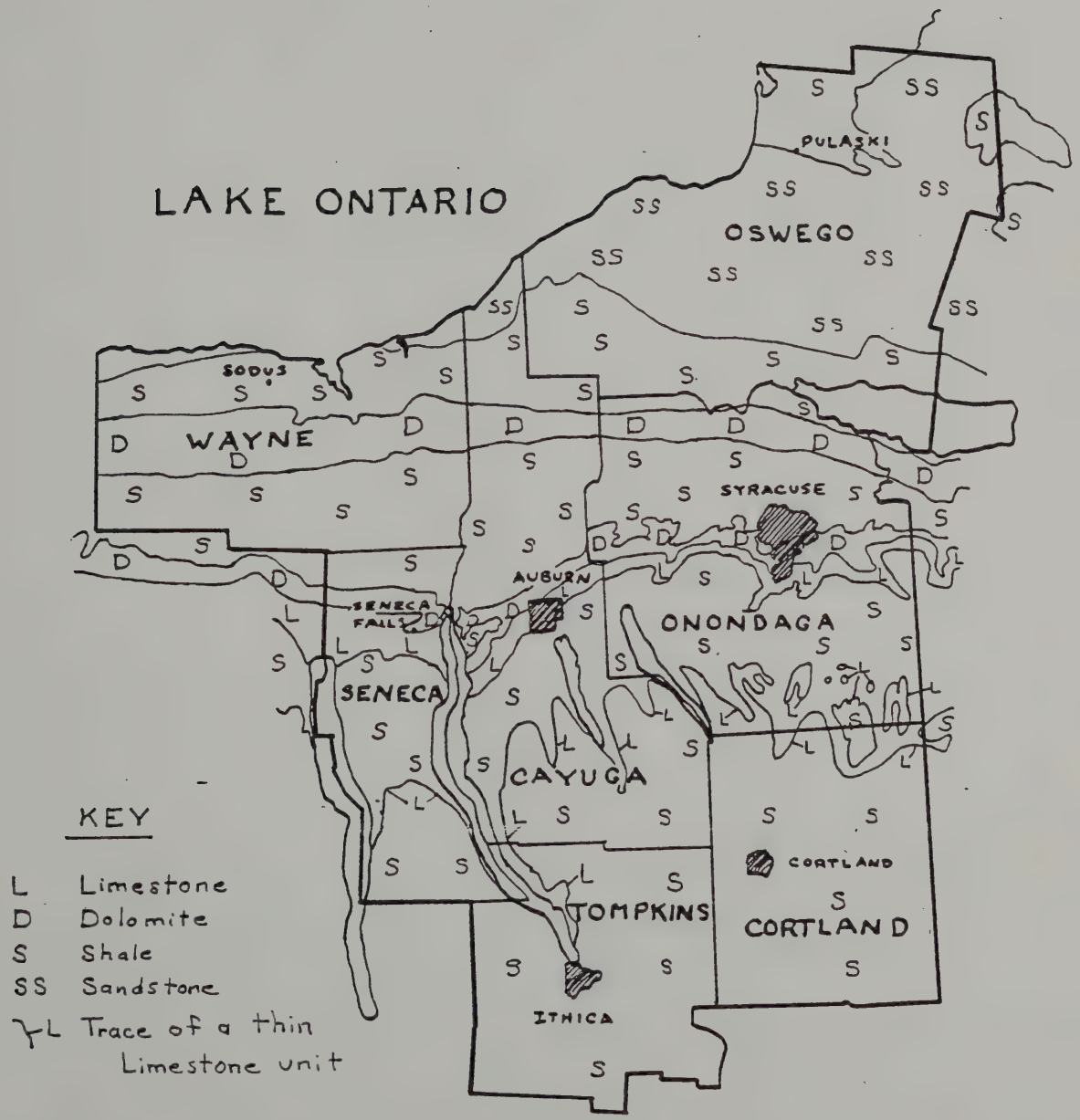
Tully Formation

The only other rock unit of economic importance is the Tully Formation. The Tully Limestone lies between the Moscow Shale below, and the Genesee Shale above, and is quarried at only one location: 3-6R at South Lansing. It is a blue-black, fine grained, massive limestone occasionally cut by thin intrusive dikes of greenish kimberlite. A transition unit between the Tully and the overlying Genesee shale is excluded from production for "State" use.

GEOLOGIC COLUMN ~ Region 3

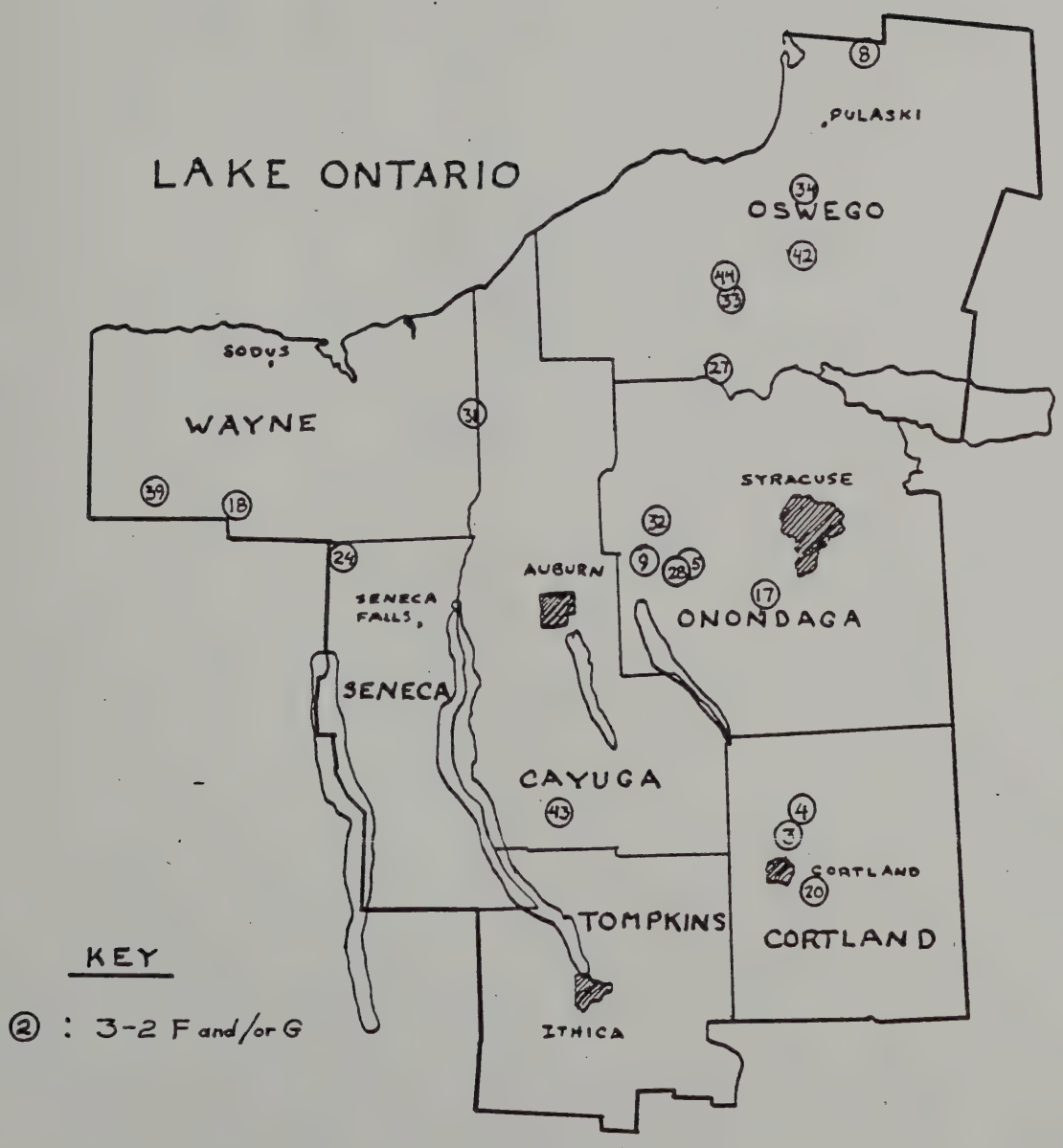
SYSTEM	GROUP	FORMATION	MEMBER	UNIT	THICKNESS	PREDOMINANT ROCK TYPE
DEVONIAN 350 - 400 Million Years Ago	HAMILTON	Genesee			20-22'	Shale
		Tully			190'	Limestone
		Moscow			265-300'	Shale
		Ludlowville				Shale
		Skaneateles	Butternut & Pompey		160-260'	Shale
			Delphi Station		100'	Shale
			Mottville		45'	Shale & Fls
		Marcellus	Cardiff		125'-200'	Shale
			Chittenango		100'	Shale
			Cherry Valley		3-8'	Limestone
			Union Springs		5-15'	Shale
			Seneca		20-25'	Limestone
			TIOGA BENTONITE		10" or less	VOLCANIC ASH
		Onondaga	Moorehouse		20-65'	Limestone
			Nedrow		10-20'	Limestone
			Clarence		0-10'	Limestone
			Edgecliff		10-20'	Limestone
		Oriskany		C B A	0-20'	Light Sandstone / Dark Sandstone / White Sandstone
	HELDERBERG	Manlius	Bishops Brook		0-7'	Limestone
			Jamesville		11-24'	Limestone
			Clark Reservation		3-5'	Limestone
			Elmwood	C B A	3-4' / 2-3' / 3-6' (3-13')	Dolomite
			Olney		25-35'	Limestone
			Thacher	Upper "OD" Lower	15' / 3' / 5' (25-30')	Limestone / Dolomite / Limestone
SILURIAN 400 - 425 Million Years Ago	CAYUGA	Rondout	Rondout (Chrysler)		30-60'	Dolomite
		Cobleskill	Cobleskill		10-30'	Dolomite
	SALINA BEDS	Bertie	Oxbow		7-10'	Dolomite
			Forge Hollow		30-60'	Shale & Dolomite
			Fiddlers Green		25-30'	Dolomite
		Camillus / Vernon			700-800'	Shale
	NIAGARA SERIES	Lockport	Oak Orchard		100'+	Dolomite
			Goat Island		20-25'	Dolomite
			Penfield		50-60'	Dolomite
			DeCew		12-15'	Dolomite
	CLINTON GROUP	Rochester	Gates		20-25'	Limestone & Shale
			Undiff. Rochester		90-120'	Shale
		Irondequoit			20-35'	Limestone
		Williamson			23-40'	Shale
		Sauquoit			33-75'	Shale
		Wolcott			10-16'	Limestone
		Sodus			45-65'	Shale
		Reynales			10-12'	Limestone
		Furnaceville / Bear Creek			0-3' / 1-10'	Iron Ore / Shale
		Thorold / Oneida Conglomerate			2-4' / 3-5'	Sandstone / Conglom.
ORDOVICIAN 425 - 450 Million Years	MEDINA	Grimsby				Sandstone
		Queenston / Oswego				Shale / Sandstone
	LORRAINE	Pulaski				Sandstone & Shale
		Frankfort				Shale
	TRENTON	Utica			600-700'	
		Canajoharie			300'	
		Coboura / Denmark / Shorham / Kirkfield / Rockland			350-475'	Limestone & Shale
	BLACK RIVER	Chaumont			3-10'	Limestone
		Lowville			8-30'	
		Pamelia			0-35'	Limestone & Dol.

REGION 3
GEOLOGY OF THE BEDROCK



REGION 3
QUARRIES

REGION 3
SAND & GRAVEL



SAND AND GRAVEL

SOURCES

OF

REGION 3

SOURCE NO.	SUPPLIER	TOWN	COUNTY	LOCATION	REMARKS
3-1F	J. J. Harrington Co.	Sennett	Cayuga	64-3-I-6 64-3-G-1	1931-1961
3-2F	J. J. Harrington Co.	Brutus	Cayuga	63-9-G-22	1965-1972
3-3F, G	Cortland Ready Mix Inc.	Homer	Cortland	84-4-V-1	1956-1979 (40% NC) Source Reports on File
3-4F, G	Concrete Materials	Homer	Cortland	84-2-A-32	1931 - A (40% NC) Source Reports on File
3-5F	W. F. Saunders & Sons	Marcellus	Onondaga	72-8-O-29	1933 - A (Sand) 1974, 1975: Rej. (Gravel) Source Reports on File
3-6F	Topat Equipment Co. Inc.	Clay	Onondaga	82-1-M-22	1956-1978 (Sand) 1972: Info. (Gravel)
3-7F, G	Massaro Co. Inc.	Volney	Oswego	71-5-M-29	1958
3-8F, G	General Crushed Stone Co.	Sandy Creek (Lacona)	Oswego	80-6-E-1	1937 - A (99% NC) Source Reports on File
3-9F, G	J. H. Davis	Scriba	Oswego	71-2-F-26	1938-1963, 1975: Info. (Sand) 1975: Info. (Gravel)
3-10F	Massaro S&G Co.	Volney	Oswego	71-5-L-26	Pre-1960
3-11F	Massaro S&G Co.	Volney	Oswego	71-5-K-23	1963: Info. (85% NC)
3-12F, G	Aggregate Materials	Cortlandville	Cortland	84-5-F/G-30/31	1965-1968 (40% NC)
3-13F	Midstate Agg. Inc.	Hasting	Oswego	81-5-E-20	
3-14F	J. W. Robinson	Sennett	Cayuga	64-3-T-20	1966-1972
3-15F, G	Rumsey-Ithaca	Ithaca	Tompkins	66-3-M-26	1963-1976 (Sand) (70% NC) 1973: Rej., 1974: Rej. (Gravel)

SOURCE NO.	SUPPLIER	TOWN	COUNTY	LOCATION	REMARKS
3-16F	Topat Equipment Co., Inc.	Clay	Onondaga	82-4-C-12	1965-1970 (Sand) 1969: Info. (Gravel)
3-17F, G	W. F. Saunders & Sons	Onondaga	Onondaga	83-1-I-25/26	1967 - A (40% NC) Source Reports on File
3-18F, G	Abram Cleason	Arcadia	Wayne	51-8-L-6	1984 - Info. (Gravel) (50% NC) 1961 - A (Sand) Source Reports on File
3-19F	General Crushed Stone Co.	Manlius	Onondaga	82D-9-R-17	1965, 1970
3-20F, G	Central Asphalt Inc. (Polkville)	Cortlandville	Cortland	84-5-I-31/32	1969 - A (55% NC) Source Reports on File
3-21F	Northern Agg. Inc.	Volney (Snyders Pt.)	Oswego	71-5-T-19	1969-1973
3-22F	Northern Agg. Inc.	Volney (Old Ladies Pt.)	Oswego	71-5-M-8	1953: Rej., 1957: Rej. 1969: Bit. only (Sand) 1969: Rej. (Gravel)
3-23F	Donald Smith	Marcellus	Onondaga	73-2-J-2	1962, 1970-1972
3-24F, G	Oaks Corners Sand	Junius	Seneca	58A-1-O-4	Formerly Warren Bros. 1984 - A 1971 Info. (50% NC)
3-25F, G	University S&G, Inc.	Caroline	Tompkins	75-5-E-15	1954, 1971-1973 Bit. only (Sand) 1971-1973 (Gravel) (80% NC)
3-26F	Northern Agg. Inc.	Volney (Paterson Pt.)	Oswego	71-5-O-19	1972-1976 (Sand) 1972: Rej. (Gravel) (80% NC)
3-27F, G	W. A. Aggregate Co.	Schroeppel	Oswego	71-9-W-29	1973 - A
3-28F, G	W. F. Saunders	Skaneateles	Onondaga	73-2-J-1	Formerly Fletcher Gravel Co Inc. 1976 - A (40% NC) Source Reports on File

SOURCE NO.	SUPPLIER	TOWN	COUNTY	LOCATION	REMARKS
3-29F, G	Special Agg. Corp.	Constantia	Oswego	91-7-W-18	1973-1976 (Jack Webb-lessor) (100% NC)
3-30F, G	Warren Bros.	Camillus	Onondaga	72-6-D-32	1976 - Info. (35% NC)
3-31F, G	B. R. DeWitt	Butler	Wayne	63-1-J/K-20/21	1977-1981, Rej. (Gravel) (70% NC), 1977 - A (Sand) Source Reports on File
3-32F	Fiato Contr. Corp.	Elbridge	Onondaga	72-8-C/D-17	1978 - A Source Reports on File
3-33F	Lewis H. Cauvin	Palermo	Oswego	71-6-T-27	1979 - A Source Reports on File
3-34F	B. R. DeWitt	Mexico	Oswego	81-2-C/E-13	1979, 1983: Info. (Gravel) (98% NC), 1979 - A (Sand) Source Reports on File
3-35F	W. A. Agg. Co.	Canastota/ Palermo	Oswego	71B-6-F/G-10	1980, 1983: Info. (Gravel) (90% NC), 1980 (Sand)
3-36F	Northern Agg. Inc.	New Haven (Whelsk Pit)	Oswego	71-3-E-25	1980, 1983: Info. (Gravel) (90% NC) 1975, 1980, 1983 Info. (Sand)
3-37F, G	Oxbow Sand & St.	S. Onondaga (Tanner Pit)	Onondaga	83-1-G-23	1981: Info. (35% NC)
3-38F, G	Onondaga Valley Farms	Preble	Cortland	83-8-J-30	1981: Info.
3-39F, G	Wayne Co. S&G	Macedon	Wayne	45D-9-S-11	1981: Info. (Gravel) (50% NC) 1981: A (Sand) Source Reports on File
3-40F	Robinson Concrete Inc	Sennet	Cayuga	64-3-T-18	1982: Info.
3-41F, G	Lazarek Inc.	Scriba	Oswego	71-2-K-19	1982: Info. (90% NC)
3-42F	Louis Chauvin	Hastings	Oswego	81-5-C-29	1983: A

SOURCE NO.	SUPPLIER	TOWN	COUNTY	LOCATION	REMARKS
3-43F, G	RMS Gravel	Genoa	Cayuga	65B-6-F-23	1983: A (18% NC)
3-44F	W. A. Aggregates Co.	Palermo	Oswego	71-6-P/Q-14	1984: Info 1985: Rej. (90% NC)
3-45F, G	W. F. Sawunders	Dryden	Tompkins	74-9-B/C-27	1986: Info (54% NC)
3-46F, G	Lewbro Ready Mix	Locke	Cayuga	74A-1-U/V-30	1986: Info (30% NC)
3-47F, G	Cortland Ready Mix, Inc.	Truxton	Cortland	84B-3-I/J-27/28	1987: Info (56% NC)

CRUSHED STONE SOURCES

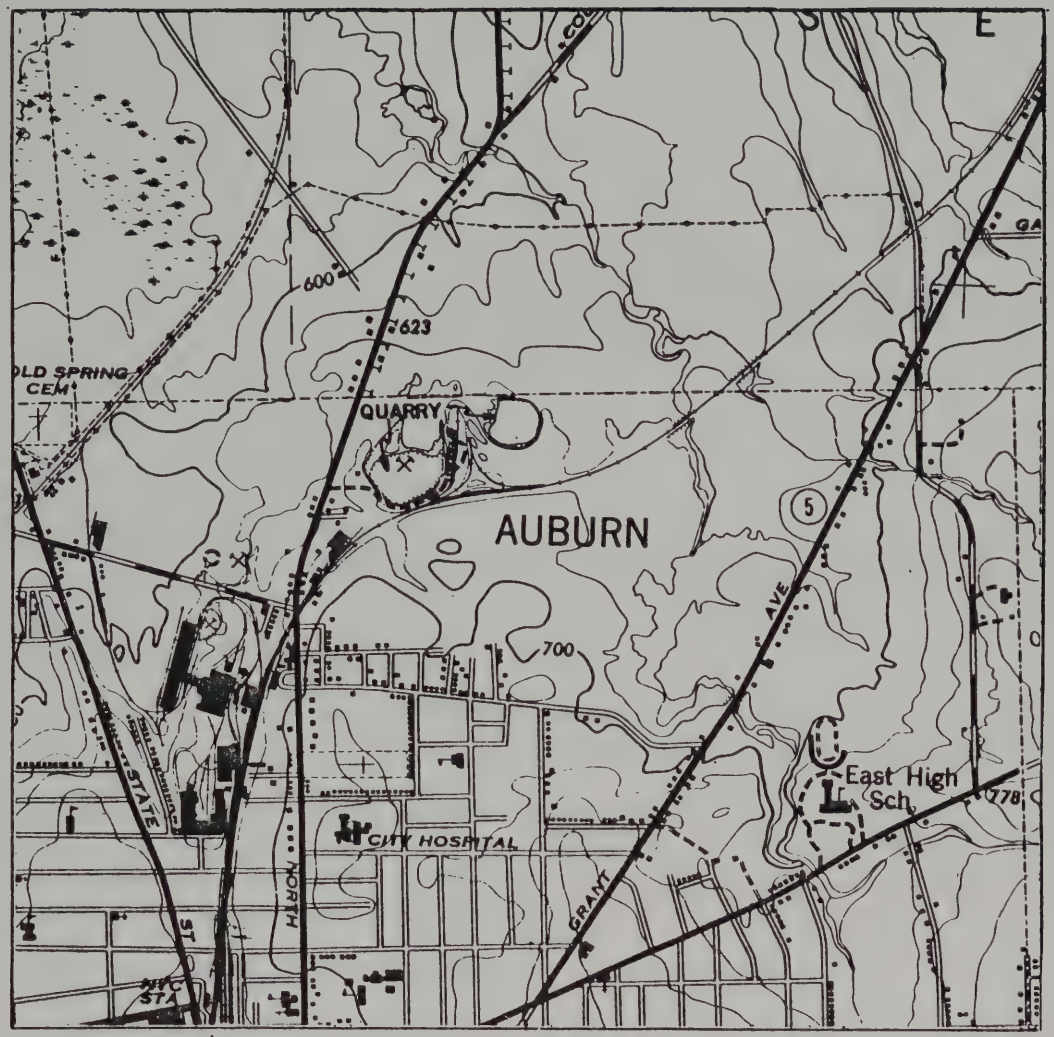
OF

REGION 3

SOURCE NO: 3-1R TOWN: Auburn (Sennett) COUNTY: Cayuga

SUPPLIER: General Crushed Stone Co. U.S.G.S. LOCATION: 64-3-E-19

LOCATION MAP



QUADRANGLE: Auburn 7½'

SOURCE NO: 3-1R

SOURCE ACTIVE FOR NYSDOT: No

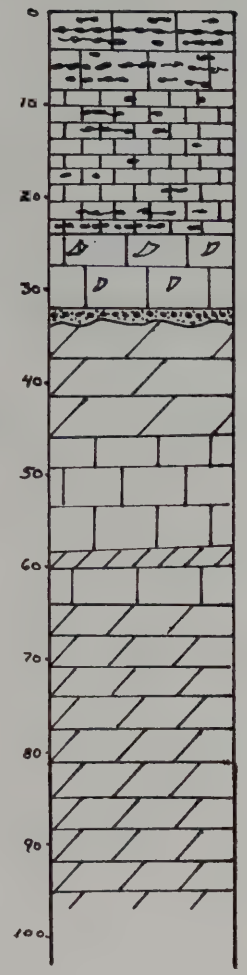
SUPPLIER: General Crushed Stone Co.

QUARRY REPORTS ON FILE: Yes

TOWN: Auburn (Sennett)

COUNTY: Cayuga

GEOLOGIC COLUMN



Onondaga Limestone (~30')

Moorehouse Member: Limestone, medium gray, fine grained, scattered "dog-bone" chert in nodular beds, medium to thick bedded. (up to ~8')

Nedrow Member: Limestone, medium to med. dark gray, fine grained, scattered chert in nodular layers, thinner bedded than the Moorehouse. (15')

Edgecliff Member: Limestone, light gray, coarse crystalline, fossiliferous particularly corals and crinoid frogments. Bottom ½ ft. contains quartz sand grains. (8')

Oriskany Sandstone (1-1 3/4')

Sandstone, medium grained carbonate-cemented quartz sand, light to dark gray. The upper section is lighter colored, well cemented and contains dark phosphatic nodules. The lower section is very dark colored and crumbles easily. (1-1 3/4')

Manlius Formation (~32')

Elmwood Member: Dolomite, medium tannish gray, fine to very fine grained, laminated argillaceous, dull earthy luster, weathers tan with strong closely-spaced vertical jointing. (11-12½')

Olney Member: Limestone, medium gray, fine grained, some stromatoporoid fossils at the top, grades downward into the Thacher Member.

Thacher Member: Limestone, medium gray, fine grained, there is a dolomitic layer about 2 ft. thick located about 4 ft. above the base of the unit.

} (~20')

Rondout Dolomite (30'+)

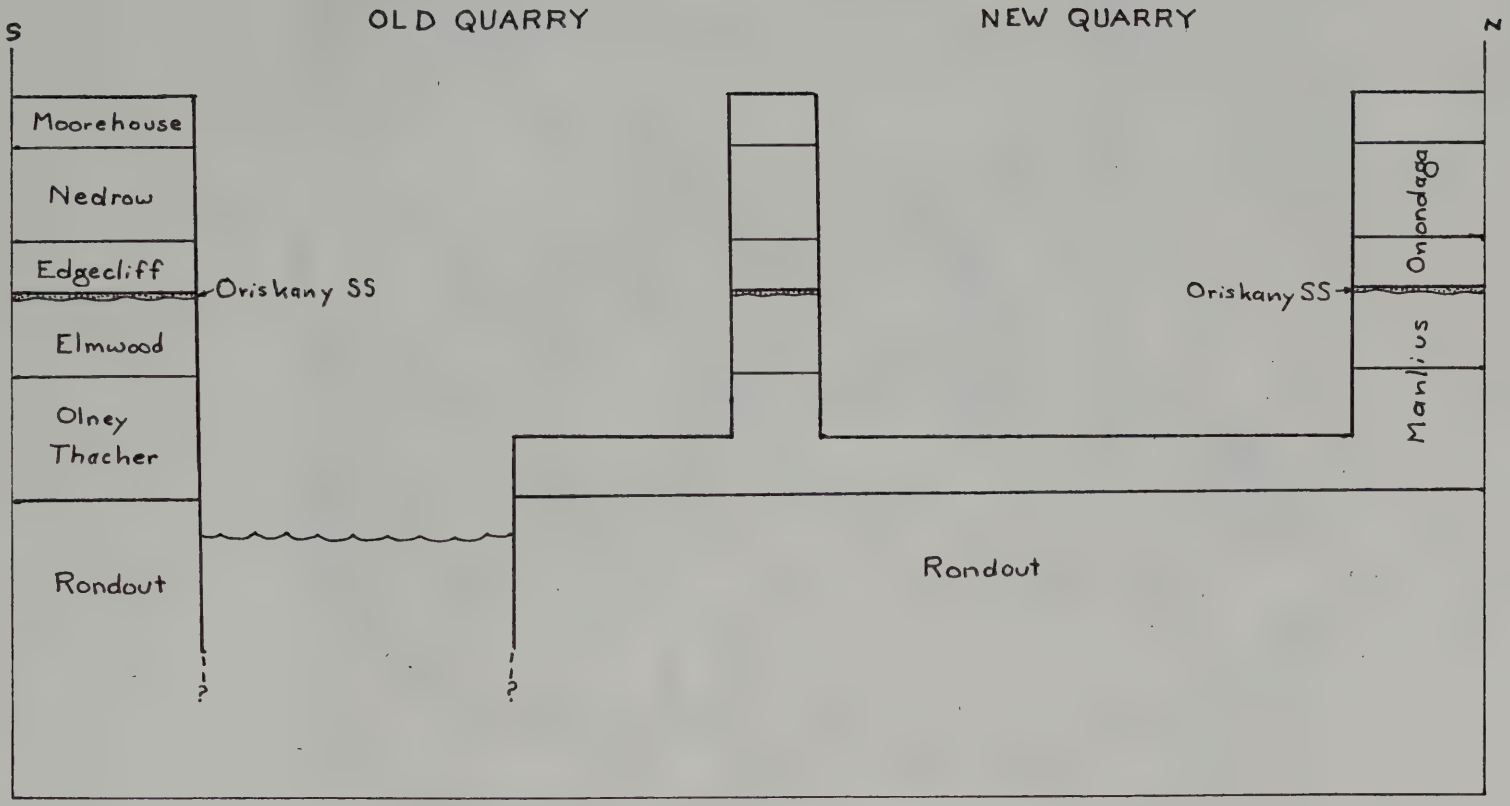
Dolomite, medium gray and tannish gray, fine grained, argillaceous, laminated. At least 25 ft of Rondout is submerged, about 6 ft are exposed.

Stratigraphic descriptions based on Chute

SOURCE NO: 3-1R

SUPPLIER: General Crushed Stone Co. TOWN: Auburn (Sennett) COUNTY: Cayuga

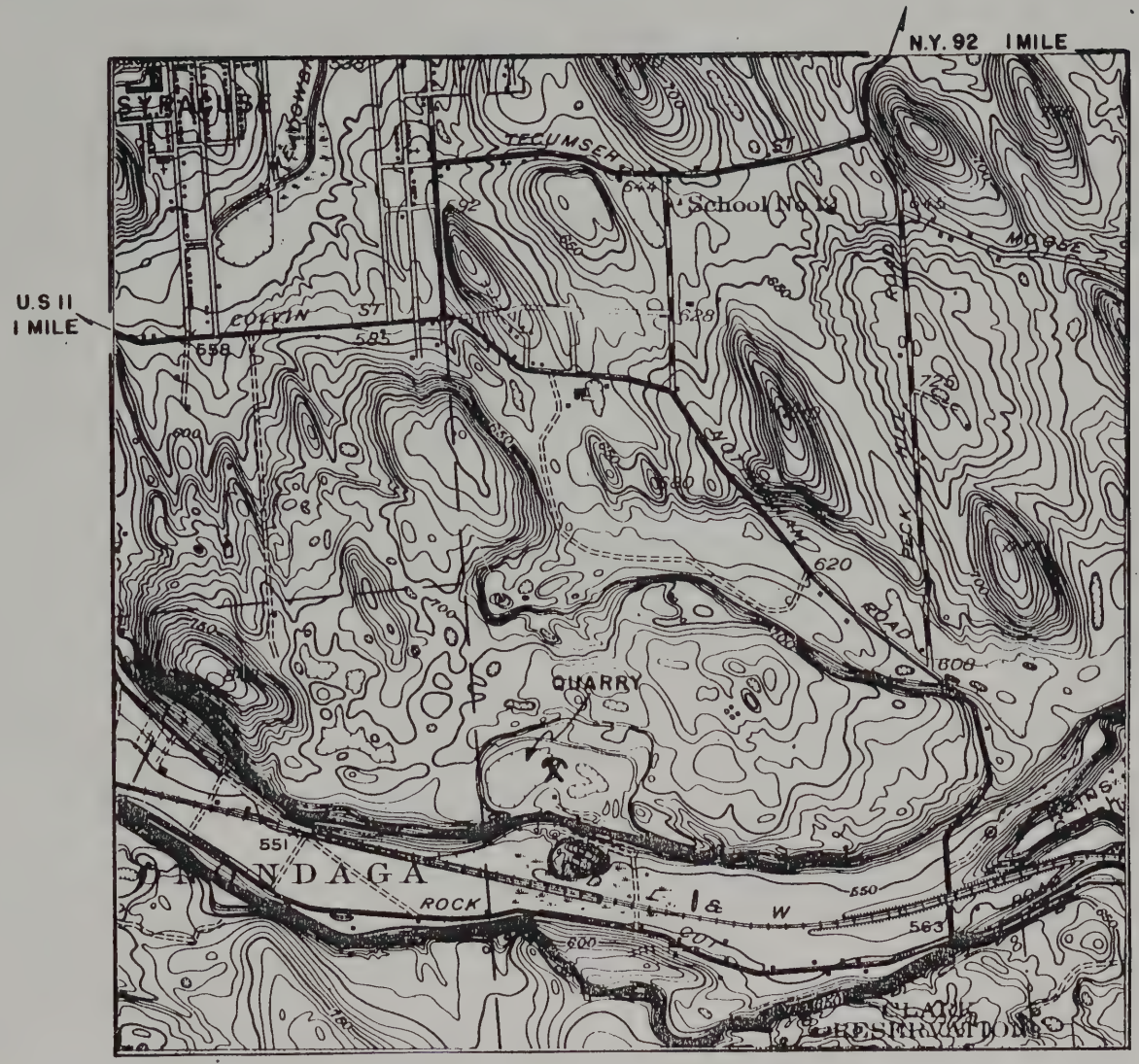
GENERALIZED GEOLOGIC CROSS SECTION



SOURCE NO: 3-2R TOWN: DeWitt COUNTY: Onondaga

SUPPLIER: General Crushed Stone Co. U.S.G.S. LOCATION: 82-8-P-30

LOCATION MAP



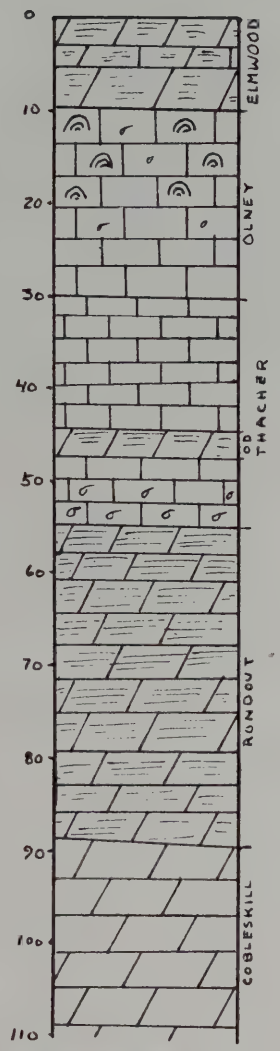
QUADRANGLE: Syracuse East 7½'

SOURCE NO: 3-2R (NORTH) SOURCE ACTIVE FOR NYSDOT: No

SUPPLIER: General Crushed Stone Co. QUARRY REPORTS ON FILE: Yes

TOWN: DeWitt COUNTY: Onondaga

GEOLOGIC COLUMN



Manlius Formation:

Elmwood Member: Dolomite and dolomitic Limestone, buff and medium gray, laminated, laminae become pronounced on weathering, generally dull, earthy luster. Divided into 3 units: A, B, & C. (10')

C: Dolomite, argillaceous, tan
B: Dolomitic Limestone, medium gray
A: Dolomite, argillaceous, tan

Olney Member: Limestone, medium gray, fine grained, fossils and stromatoporoids in zones, "Drab & Blue" in lower portion, middle portion is "lumpy" bedded. (20')

Thacher Member: Limeston, medium gray, fine grained, "Drab & Blue" in upper portion distinguised from overlying Olney by somewhat thinner bedding. (13')

"OD" Thacher: Dolomite, argillaceous, tan, laminated in portions, dull earthy luster. (3')

Lower Thacher: Limestone, gray to brownish gray, fine grained, fossiliferous in the lower portion. (8')

Rondout Formation: Dolomite, alternating layers of buff and blue gray, argillaceous, fine grained, laminated in many units. (35')

Cobleskill Formation: Dolomite: medium gray, fine to medium crystalline to sucrosic, somewhat fossiliferous, has an overall brownish cast, massive. (25-30')

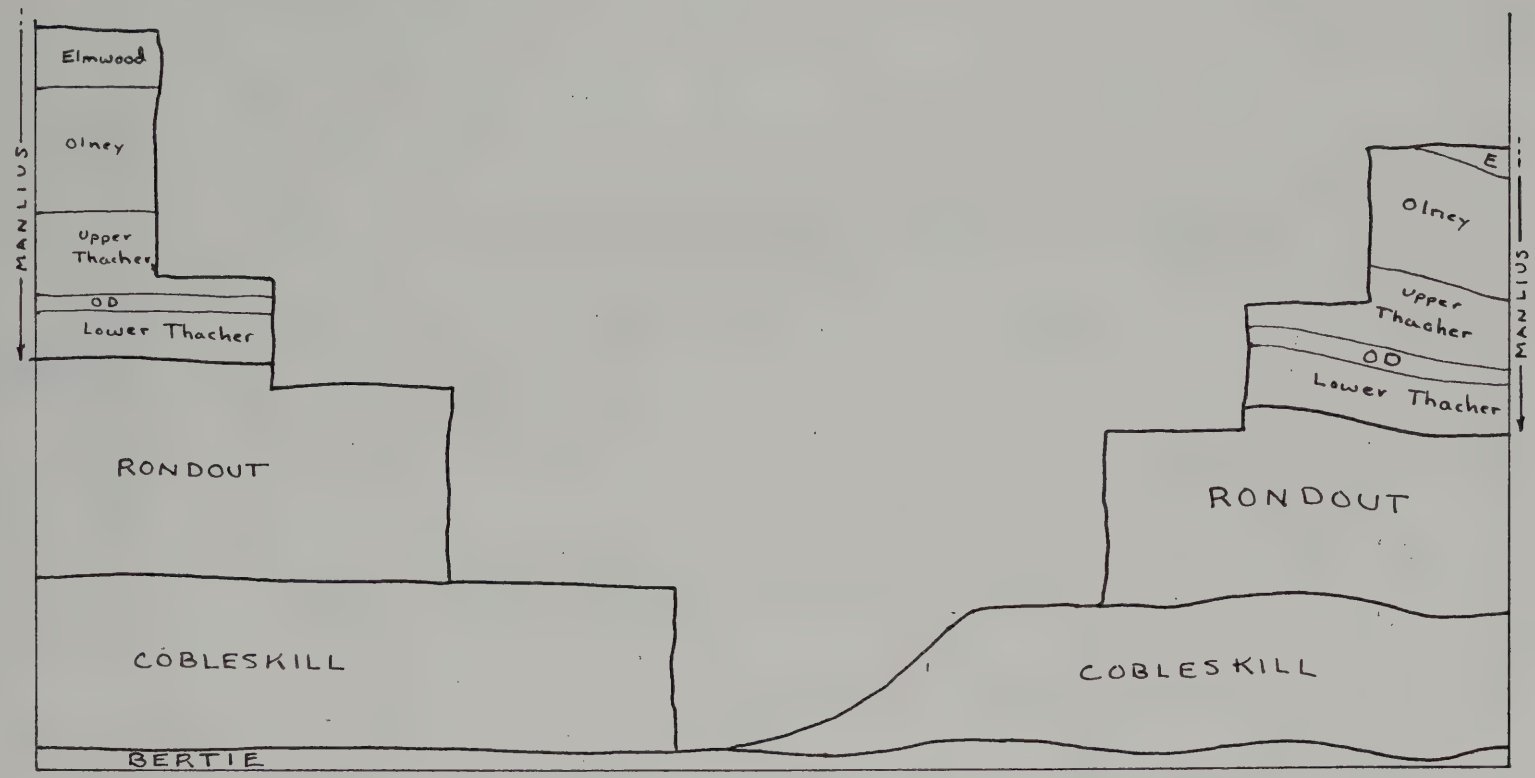
Bertie Formation: Dolomite: brown

Stratigraphic descriptions based on Sherrit

SOURCE NO: 3-2R (NORTH)

SUPPLIER: General Crushed Stone Co. TOWN: DeWitt COUNTY: Onondaga

GENERALIZED GEOLOGIC CROSS SECTION



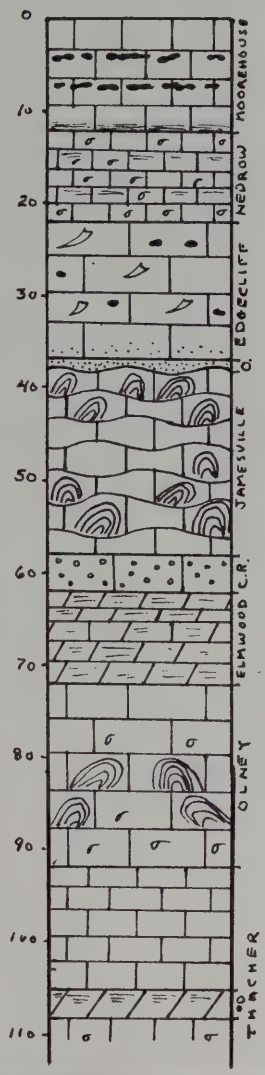
vertical scale: 1"=30'

SOURCE NO: 3-2R (SOUTH) SOURCE ACTIVE FOR NYSDOT: No

SUPPLIER: General Crushed Stone Co. QUARRY REPORTS ON FILE: Yes

TOWN: DeWitt COUNTY: Onondaga

GEOLOGIC COLUMN



Onondaga Formation:

Moorehouse Member: Limestone, med.-dark gray, fine crystalline, some "dogbone" chert in nodular zones, shaly at base, massive to medium bedded. (12'±)

Nedrow Member: Limestone, dark gray fine crystalline, scattered partings and laminations, fossil fragments in zones. (10')

Edgecliff Member: Limestone, light gray, med.-coarsely crystalline, occasional chert nodule, abundant cup corals and crinoid stem fragments, sandy at base. (15')

Oriskany Formation: Calcareous Sandstone, light gray, stained, medium grained, small black phosphatic nodules near the top. (½'-1')

Manlius Formation:

Jamesville Member: Limestone, med. to dark gray, fine to medium crystalline, beds of stromatoporoids (reef algae, "cabbage heads") and oncolites (small algal buttons.) (20')

Clark Reservation Member: Limestone, med. gray, medium grained, oolitic. (4')

Elmwood Member: Dolomite and Dolomitic Limestone, generally buff and medium gray, laminated and having a dull, earthy luster. Divided into A, B & C units (see Column for the North Quarry) (10')

Olney Member: Limestone, medium gray, fine grained, fossils and stromatoporoids in zones, "drab and blue" in lower portion. (20')

Thacher Member: Limestone medium gray, fine grained, "drab and blue" in upper portion. (13')

"OD" Thacher: Dolomite, argillaceous, tan, laminated in portions, dull earthy luster. (3')

Lower Thacher: Limestone, gray to brownish gray, fine grained, fossiliferous in the lower portion. (8')

Rondout Formation: Dolomite, alternating layers of buff and blue-gray, argillaceous, fine grained, laminated in many units. (35')

Stratigraphic descriptions based on Sherritt

SOURCE NO: 3-2R (SOUTH)

SUPPLIER: General Crushed Stone Co. TOWN: De Witt COUNTY: Onondaga

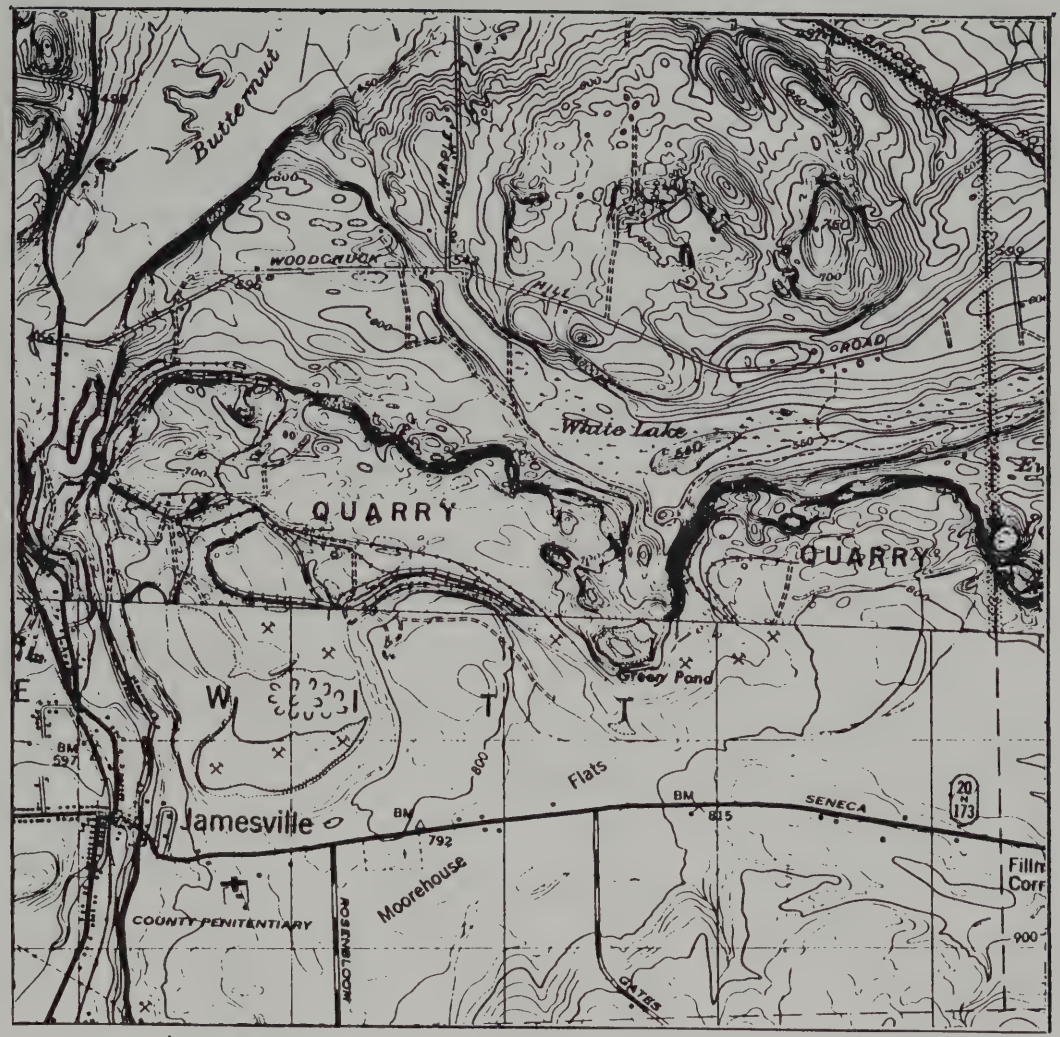
GENERALIZED GEOLOGIC CROSS SECTION

vertical scale: 1"=30'

SOURCE NO: 3-3R TOWN: Jamesville (DeWitt) COUNTY: Onondaga

SUPPLIER: The General Crushed Stone Co. U.S.G.S. LOCATION: 83-3-G-2

LOCATION MAP



QUADRANGLE: Syracuse East, Jamesville } 7½'

34

SOURCE NO: 3-3R

SOURCE ACTIVE FOR NYSDOT: Yes

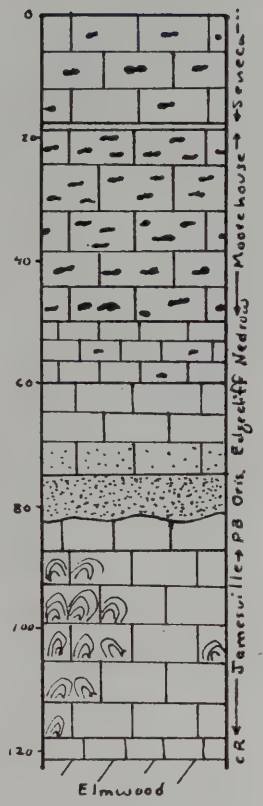
SUPPLIER: The General Crushed Stone Co.

QUARRY REPORTS ON FILE: Yes

TOWN: Jamesville

COUNTY: Onondaga

GEOLOGIC COLUMN



Onondaga Formation:

Seneca Member: Limestone, dark - medium gray, finely crystalline, some black chert occuring in nodules.

Moorehouse Member: Limestone, medium gray, fine to medium crystalline, black chert occuring in nodules.

Nedrow Member: Limestone, dark gray, finely crystalline, argillaceous, pyrite, occasional black chert.

Edgecliff Member: Limestone, med - light gray, medium crystalline, fossiliferous, quartz sand in the lower portion (some times refered to as "Springvale Member")

Oriskany Formation: Sandstone, gray to buff, medium grained. Sandstone consists of quartz sand with a calcareous cement; tends to be friable.

Manlius Formation:

Pools Brook Member: Limestone, med-dark gray, finely crystalline.

Jamesville Member: Limestone, med-dark gray, finely crystalline, may contain cabbage-head fossils (stromatoporoids) in abbundance.

Clark Reservation Member: Limestone, med.-dark gray, finely crystalline, the oolitic structure is only revealed in weather sections.

(continued)

SOURCE NO: 3-3R

SOURCE ACTIVE FOR NYSDOT: Yes

SUPPLIER: The General Crushed Stone Co

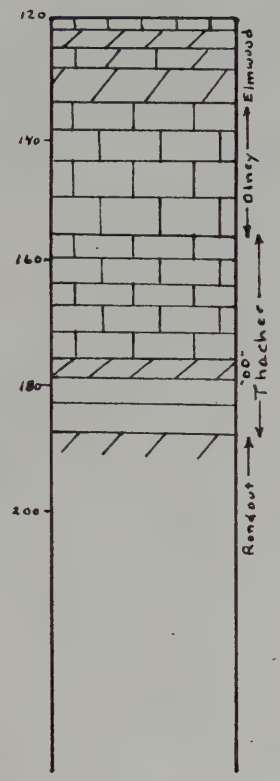
QUARRY REPORTS ON FILE: Yes

TOWN: Jamesville

COUNTY: Onondaga

GEOLOGIC COLUMN

(continued)



Manlius Formation:

Elmwood: Dolomite & Dolomitic Limestone: buff to med. gray, fine grained laminated, argillaceous, often displays a dull, earthy luster.

Olney Member: Limestone, medium gray, finely crystalline, some what argillaceous thin irregular interbeds weather "drab & blue".

Thacher Member:

Upper Thacher: Limestone, medium gray, finely crystalline, very similar to the overlying Olney, "drab & blue".

"OD" Bed: Dolomite: buff to gray, fine grained, argillaceous, laminated.

Lower Thacher: Limestone, somewhat dolomitic, medium brownish gray, finely crystalline, reefy.

Rondout Formation:

Dolomite & Calcareous Dolomite, buff to gray in alternating units, fine grained, argillaceous, often laminated.

Structure: Minor folding and faulting are a result of collapse at depth.

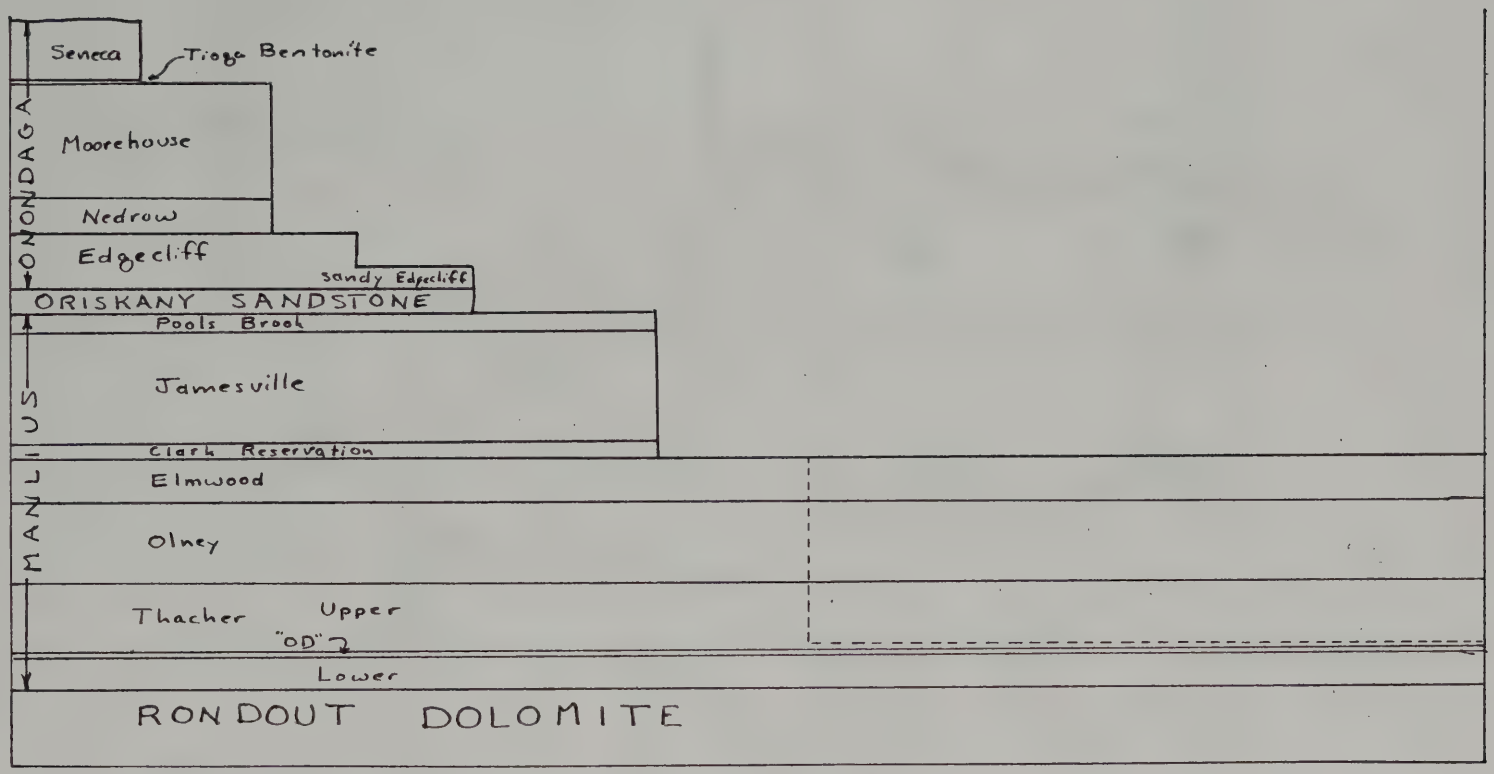
Note: The Edgecliff Member of the Onondaga Formation and the Pools Brook, Jamesville, and Clark Reservation Members of the Manlius Formation have been quarried here as "chemical stone" because of their purity.

Stratigraphic description based on Ozol, French, & Agostino

SOURCE NO: 3-3R

SUPPLIER: The General Crushed Stone Co. TOWN: Jamesville COUNTY: Onondaga

GENERALIZED GEOLOGIC CROSS SECTION



Vertical Scale: 1"=50'

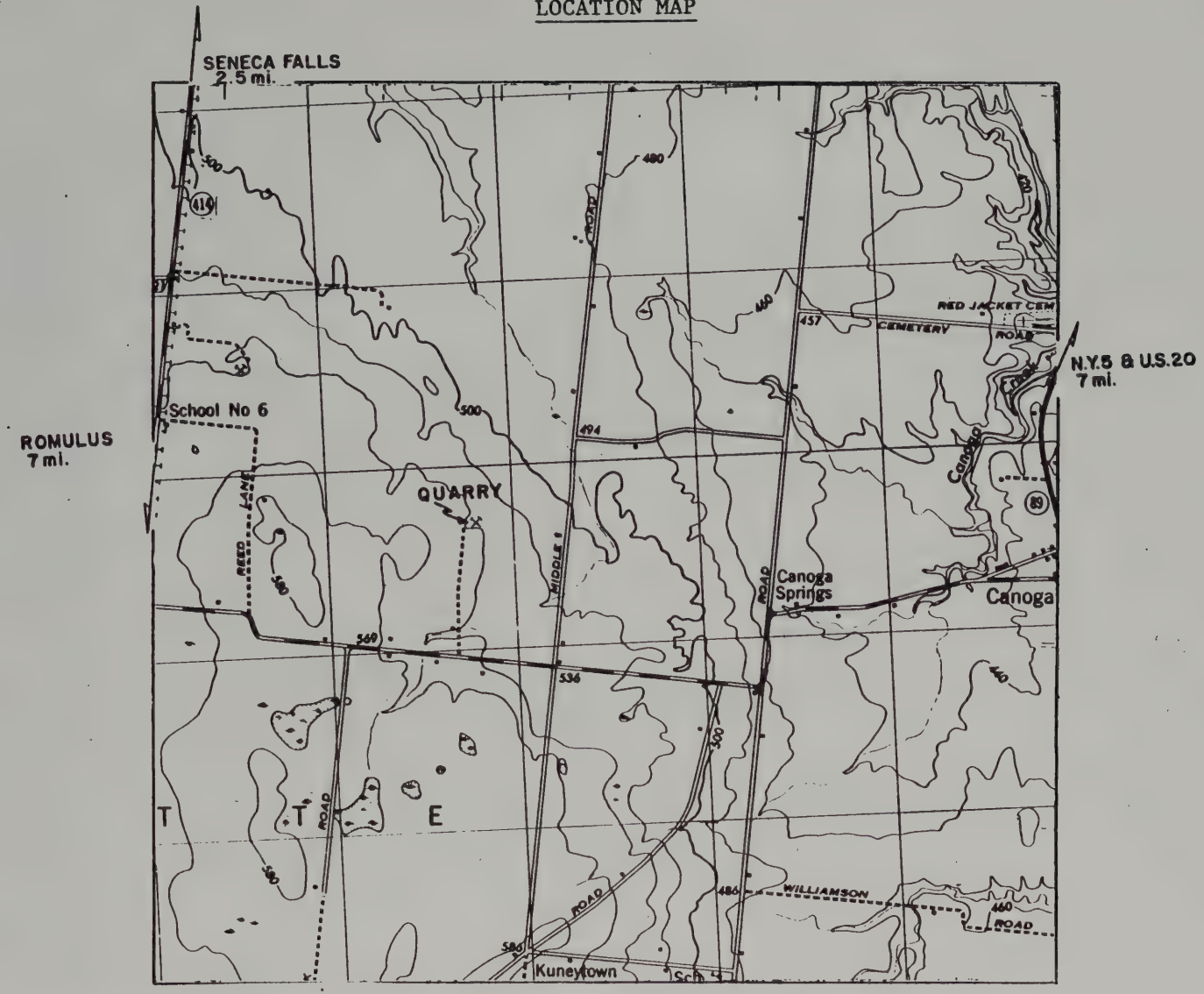
SOURCE NO: 3-4R

TOWN: Fayette (Canoga) COUNTY: Seneca

SUPPLIER: Dalrymple (Seneca Stone Co.)

U.S.G.S. LOCATION: 58-6-0-25

LOCATION MAP



QUADRANGLE: Romulus 7½'

SOURCE NO: 3-4R

SOURCE ACTIVE FOR NYSDOT: Yes

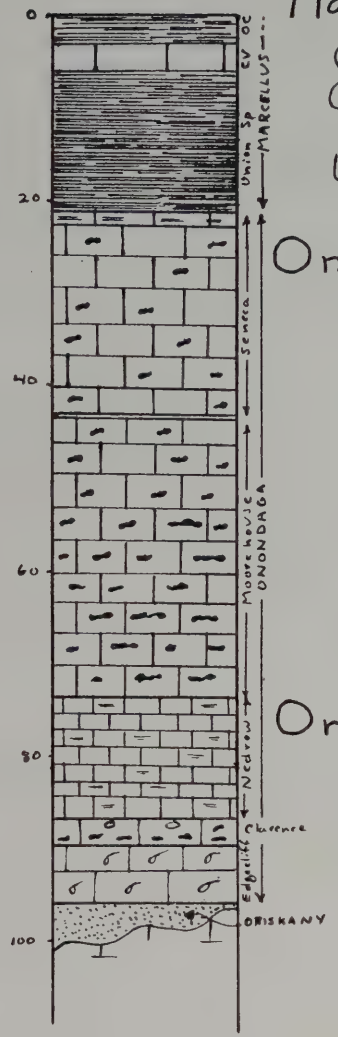
SUPPLIER: Dalrymple (Seneca Stone Co.)

QUARRY REPORTS ON FILE: Yes

TOWN: Fayette (Canoga)

COUNTY: Seneca

GEOLOGIC COLUMN



Marcellus Formation:

Oatka Creek: Shale, calcareous, dark gray, scattered pyrite

Cherry Valley: Limestone, med. to dark gray, medium crystalline, massive, fossiliferous containing characteristic straight chephalopods and brachiopods, scattered pyrite.

Union Springs: Shale, calcareous and carbonaceous, gray to black, fissility pronounced, transitional with limestone at the base.

Onondaga Formation:

Seneca Member: Limestone, medium gray, finely crystalline, occasional shale seam, some chert.

Moorehouse Member: Limestone, med.-dark gray, finely crystalline, cherty, lower 10 feet contain shaly partings.

Nedrow Member: Limestone, med.-dark gray, fine grained, argillaceous, shaly, some chert, jointing planes dip 30° SE, scattered pyrite.

Clarence Member: Limestone, med. to dark grain, med-finely crystalline, scattered white chert in upper 2', lower portion contains scattered black chert.

Edgecliff Member: Limestone, light gray, med. to coarse crystalline, fossiliferous, occ. black chert nodule near the base.

Oriskany Formation: Quartzose Sandstone, med. gray-tan to white, med. to crs. grained calcareous cement, brachiopod zone near the top, corals in friable lower portion, occasional phosphatic nodules.

(continued)

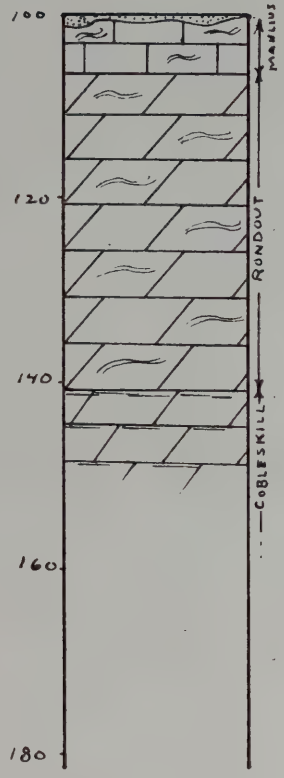
SOURCE NO: 3-4R SOURCE ACTIVE FOR NYSDOT: Yes

SUPPLIER: Dalrymple (Seneca Stone Co.) QUARRY REPORTS ON FILE: Yes

TOWN: Fayette (Canoga) COUNTY: Seneca

GEOLOGIC COLUMN

(continued)



Manlius Formation:

Thacher Member: Limestone, dolomitic in places, med to dark gray, fine to medium crystalline, lamination and color banding.

Rondout Formation: Dolomite, alternating tan and med. grain, fine grained, argillaceous, laminated, dull earthy luster.

Cobleskill Formation: Dolomite, med to dark gray, fine grained, massive, frequent shaly partings, few fossils.

Structure: Beds tend to roll and there are some prominent faults due to collapse at depth.

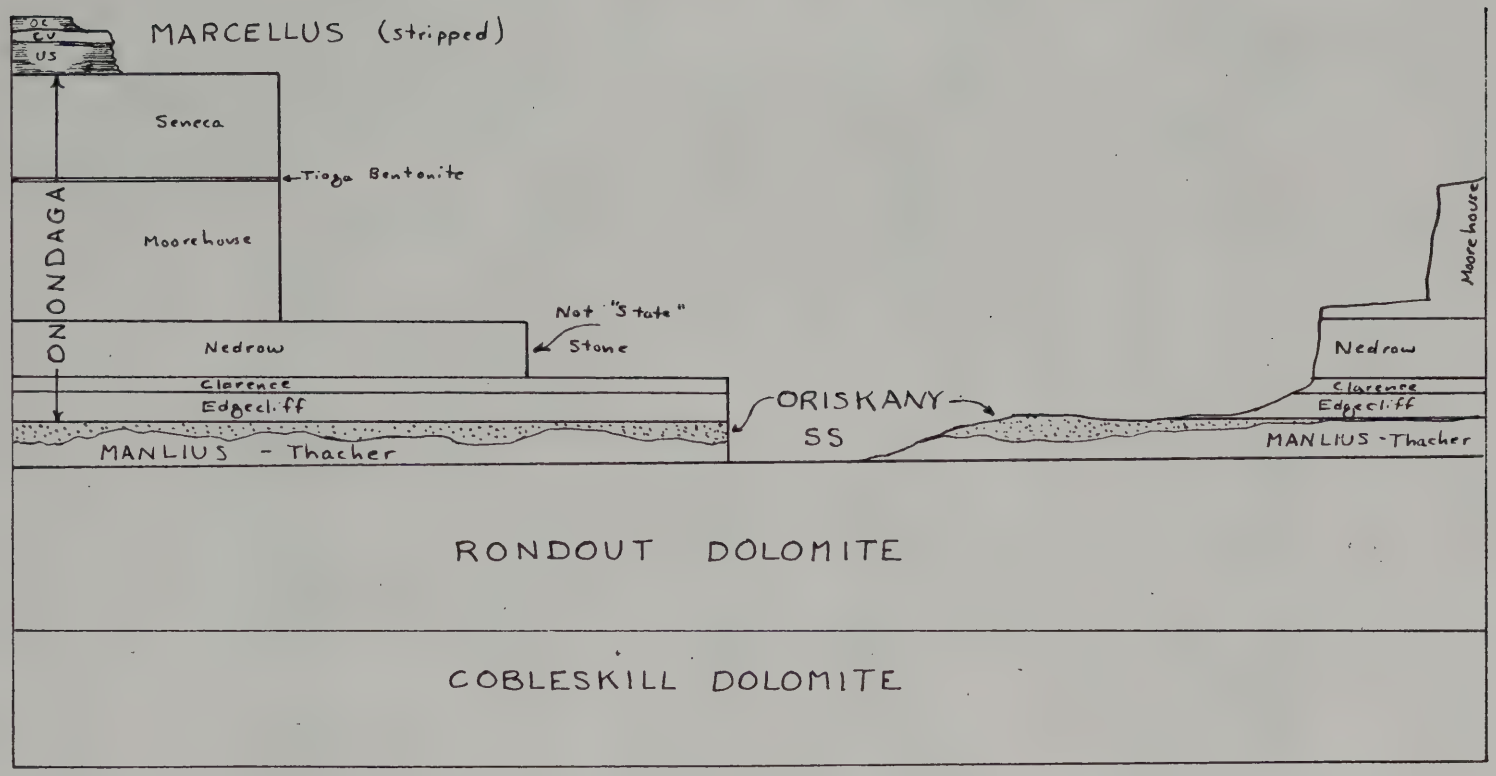
Note: Shale may be a problem at the south end. The Nedrow must be selectively removed and kept out of "State" stone. Oriskany sandstone comes and goes and is inconsistent enough that it could not be included in a selective quarrying plan.

Stratigraphic descriptions based on Dickenson, Helkert, & Gansfuss

SOURCE NO: 3-4R

SUPPLIER: Dalrymple (Seneca Stone Co.) TOWN: Fayette (Canoga) COUNTY: Seneca

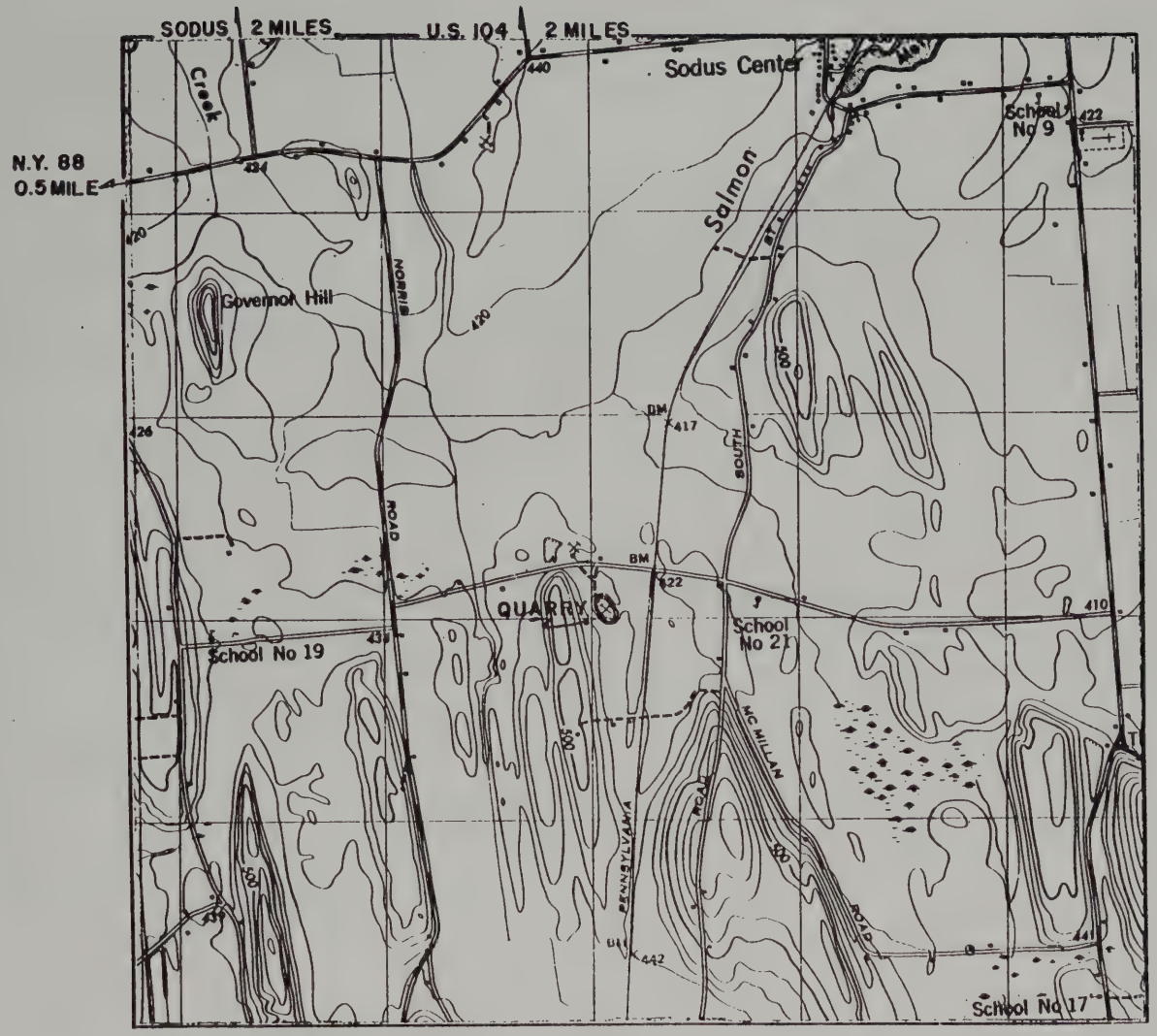
GENERALIZED GEOLOGIC CROSS SECTION



SOURCE NO: 3-5R TOWN: Sodus COUNTY: Wayne

SUPPLIER: General Crushed Stone Co. U.S.G.S. LOCATION: 51-3-L-27

LOCATION MAP



QUADRANGLE: Sodus 7½'

42

SOURCE NO: 3-5R

SUPPLIER: General Crushed Stone Co.

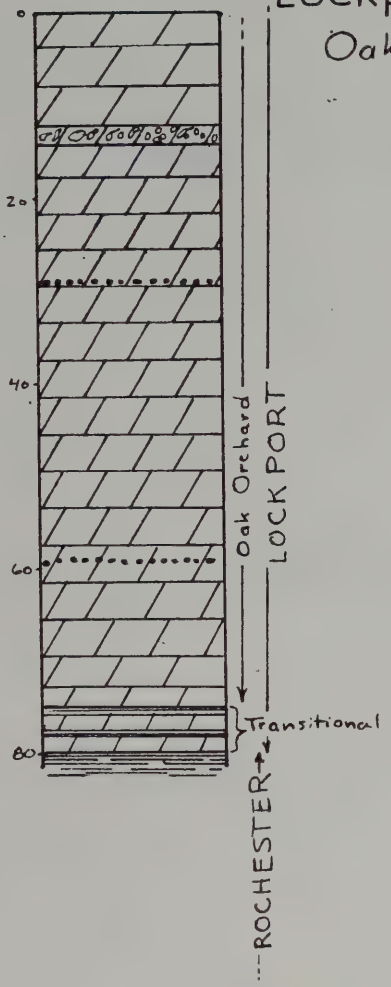
TOWN: Sodus

SOURCE ACTIVE FOR NYSDOT: Yes

QUARRY REPORTS ON FILE: Yes

COUNTY: Wayne

GEOLOGIC COLUMN



Lockport Formation:

Oak Orchard Member:

Dolomite: dark brownish gray, sandy, mottled light brown, some vugs.

Dolomite: porous, coral rich MARKER BED

Dolomite: dark brown to brownish gray fine to medium crystalline, sandy texture, vuggy in zones, porous zones due to numerous tiny vugs, zones with color banding, dolomite pebble conglomerate make good marker beds.

Dolomite Interbedded with Shale: Transition Zone

Shale: black, dolomitic

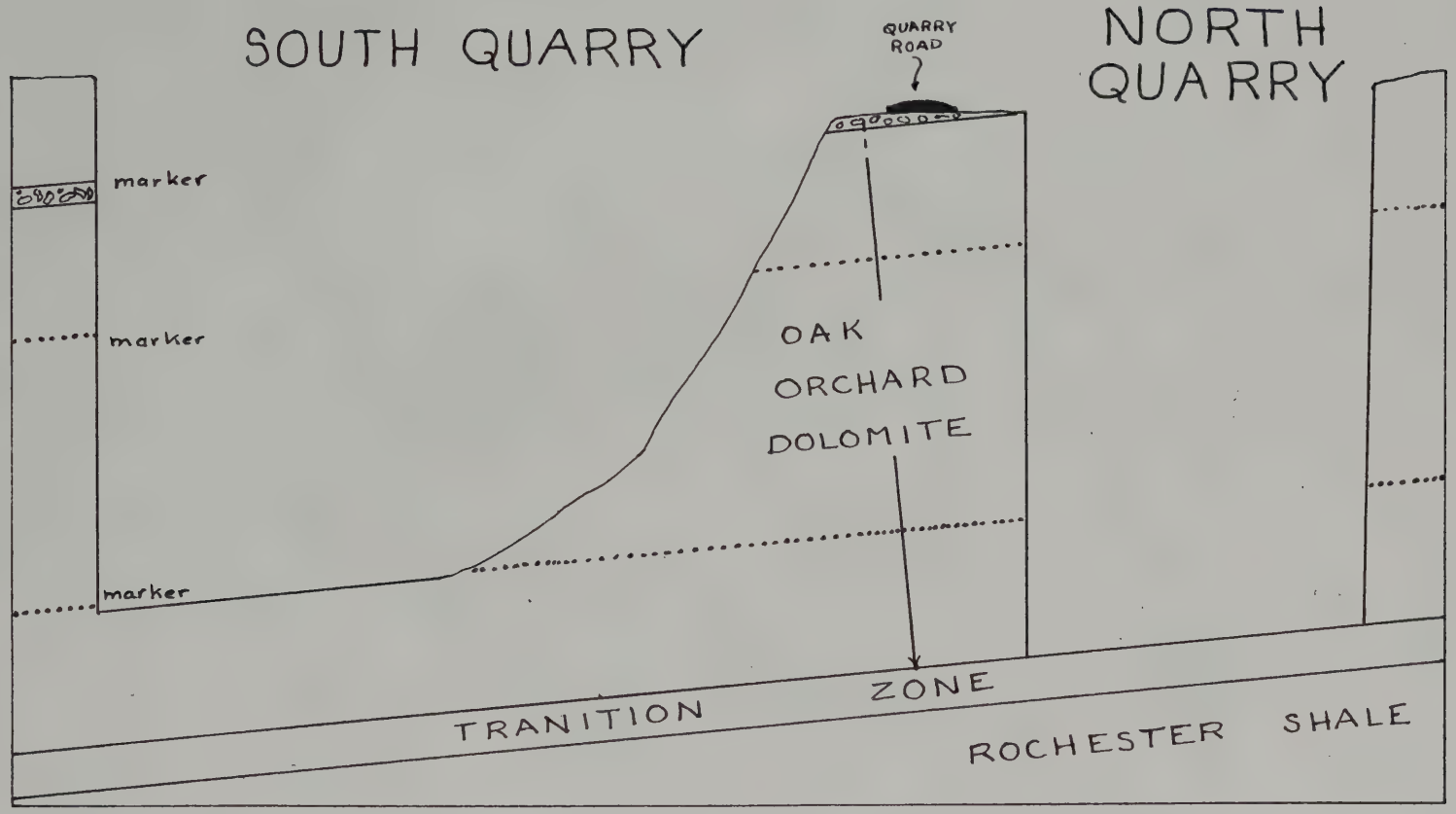
Structure: Generally flat-lying with a gentle dip to the south at ~40-50'/mi

Stratigraphic descriptions based on Woodrow, Skerritt, Rosenman

SOURCE NO: 3-5R

SUPPLIER: General Crushed Stone Co. TOWN: Sodus COUNTY: Wayne

GENERALIZED GEOLOGIC CROSS SECTION

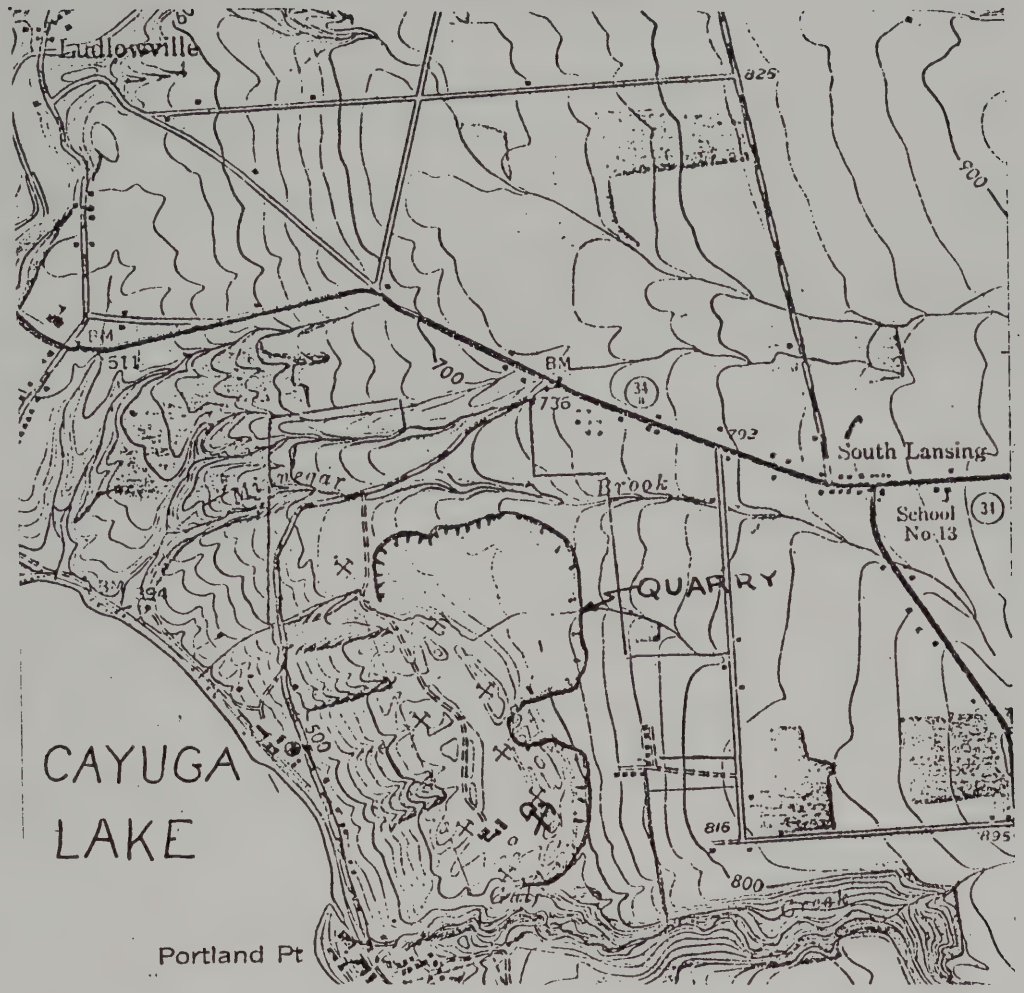


Vertical Scale: 1" = 20'

SOURCE NO: 3-6R TOWN: Lansing COUNTY: Tompkins

SUPPLIER: Cayuga Crushed Stone Co. U.S.G.S. LOCATION: 65-9-P-21

LOCATION MAP



QUADRANGLE: Ludlowville 7½'

SOURCE NO: 3-6R

SOURCE ACTIVE FOR NYSDOT: Yes

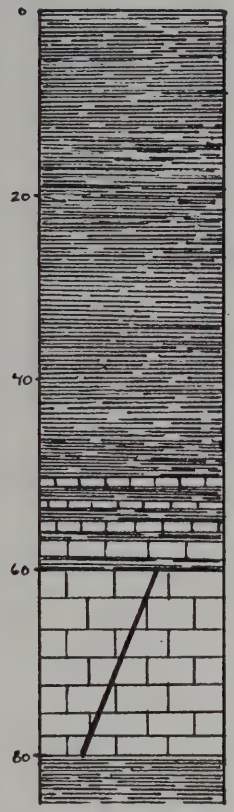
SUPPLIER: Cayuga Crushed Stone Co.

QUARRY REPORTS ON FILE: Yes

TOWN: Lansing

COUNTY: Tompkins

GEOLOGIC COLUMN



Geneseo Formation: Shale, black, fissil, finely laminated, slightly silty, smooth parting faces having micaceous particles, uniform, no fossils.

Transition Zone: Calcareous Shale interbedded with 3" to 12" bed of Limestone that are dark gray, fine grained and argillaceous. Limestone content increased downwards until it becomes the predominent rock type

Tully Formation: Limestone, medium gray, fine grained, shaly anastomosing laminations and stylolites, some crystallized corals, calcite veins and white clasts surrounded by dark laminae. Peridotite dikes that are roughly vertical and from a few inches to over a foot thick are occasionally seen.

Moscow Formation: Shale, black, calcareous, fossiliferous

Structure: Generally flat-lying, joint trend N 12°W

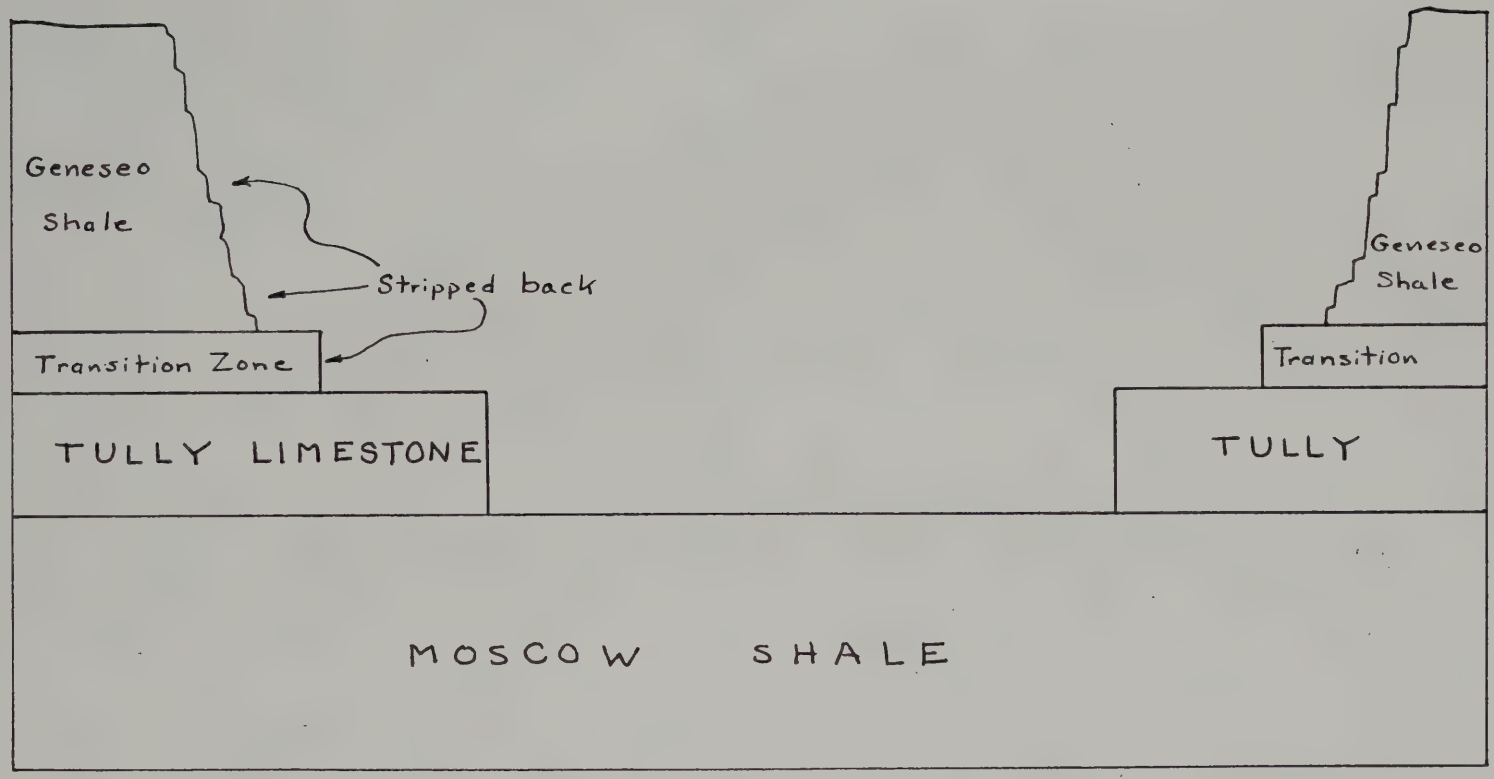
Note: Shale and excessive peridotite is a potential problem.

Stratigraphic descriptions based on Chute

SOURCE NO: 3-6R

SUPPLIER: Cayuga Crushed Stone Co. TOWN: Lansing COUNTY: Tompkins

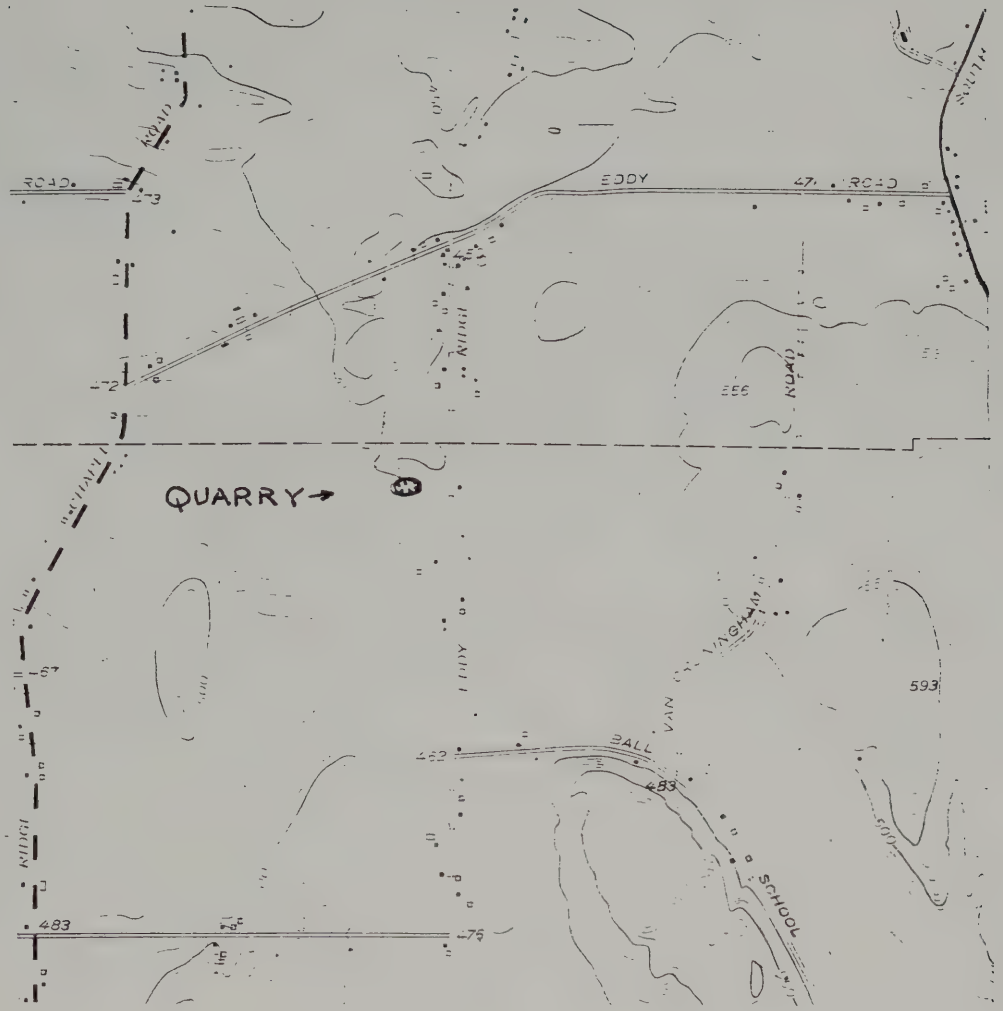
GENERALIZED GEOLOGIC CROSS SECTION



SOURCE NO: 3-7R TOWN: Marion COUNTY: Wayne

SUPPLIER: General Crushed Stone Co. U.S.G.S. LOCATION: 51-1-I-20

LOCATION MAP



QUADRANGLE: Williamson 7½'

SOURCE NO: 3-7R

SUPPLIER: General Crushed Stone Co.

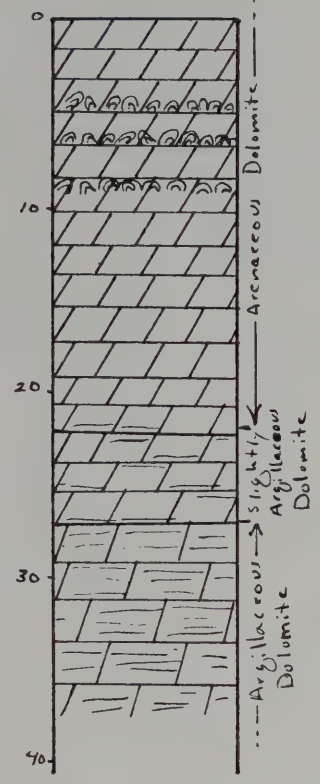
TOWN: Marion

SOURCE ACTIVE FOR NYSDOT: No

QUARRY REPORTS ON FILE: Yes

COUNTY: Wayne

GEOLOGIC COLUMN



Lockport Formation:

Penfield Member: Dolomite, medium gray, fine grained, arenaceous (contains abundant quartz sand grains), thin zones contain abundant coral reef material.

Dolomite, medium light gray, fine grained, irregular stringers of argillaceous material (comprises less than 5% of the rock.

Dolomite, medium to medium light gray, fine grained, irregular stringers of argillaceous material (comprises greater than 5% of the rock

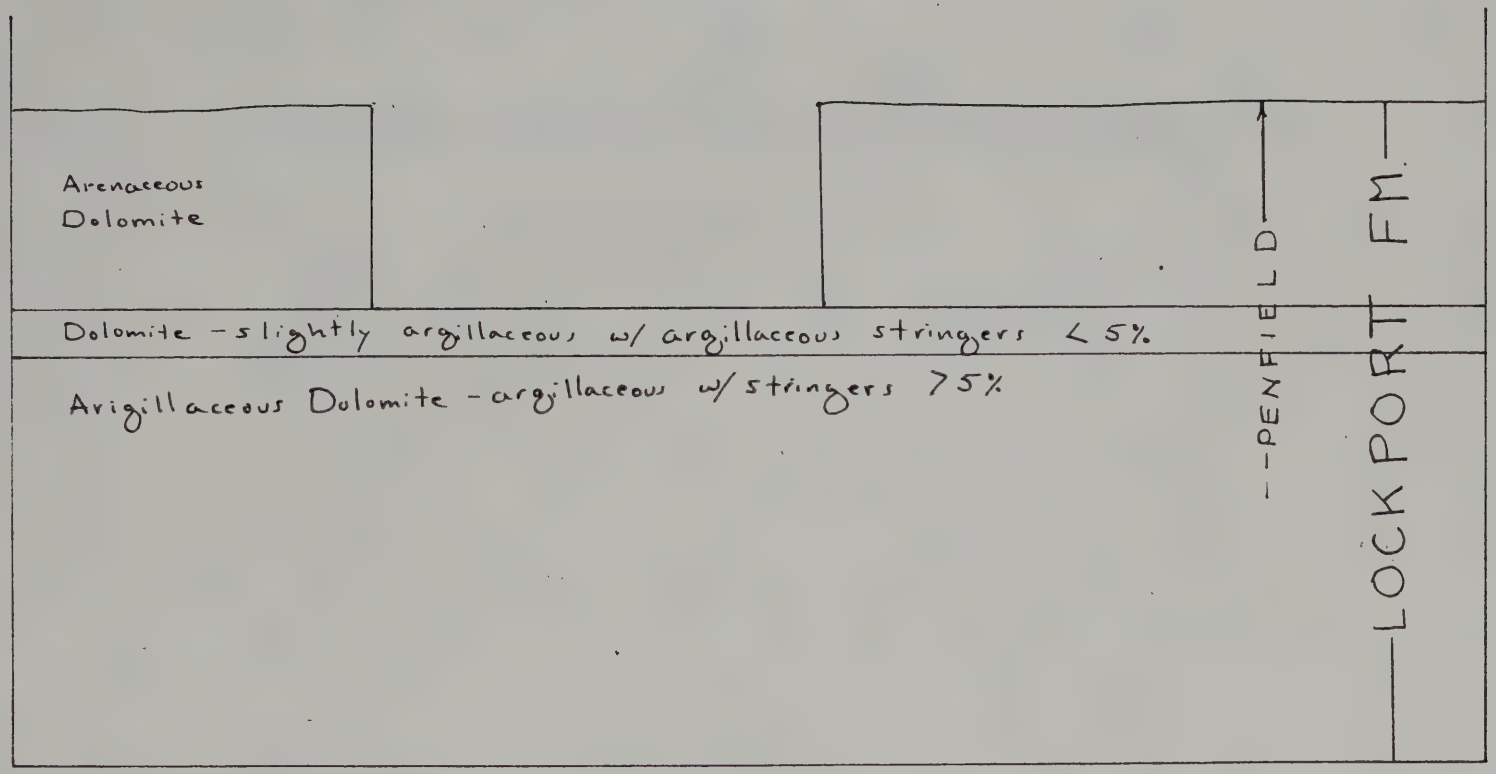
Structure: generally flat-lying horizontal beds

Stratigraphi description based on Cutcliffe

SOURCE NO: 3-7R

SUPPLIER: General Crushed Stone Co. TOWN: Marion COUNTY: Wayne

GENERALIZED GEOLOGIC CROSS SECTION

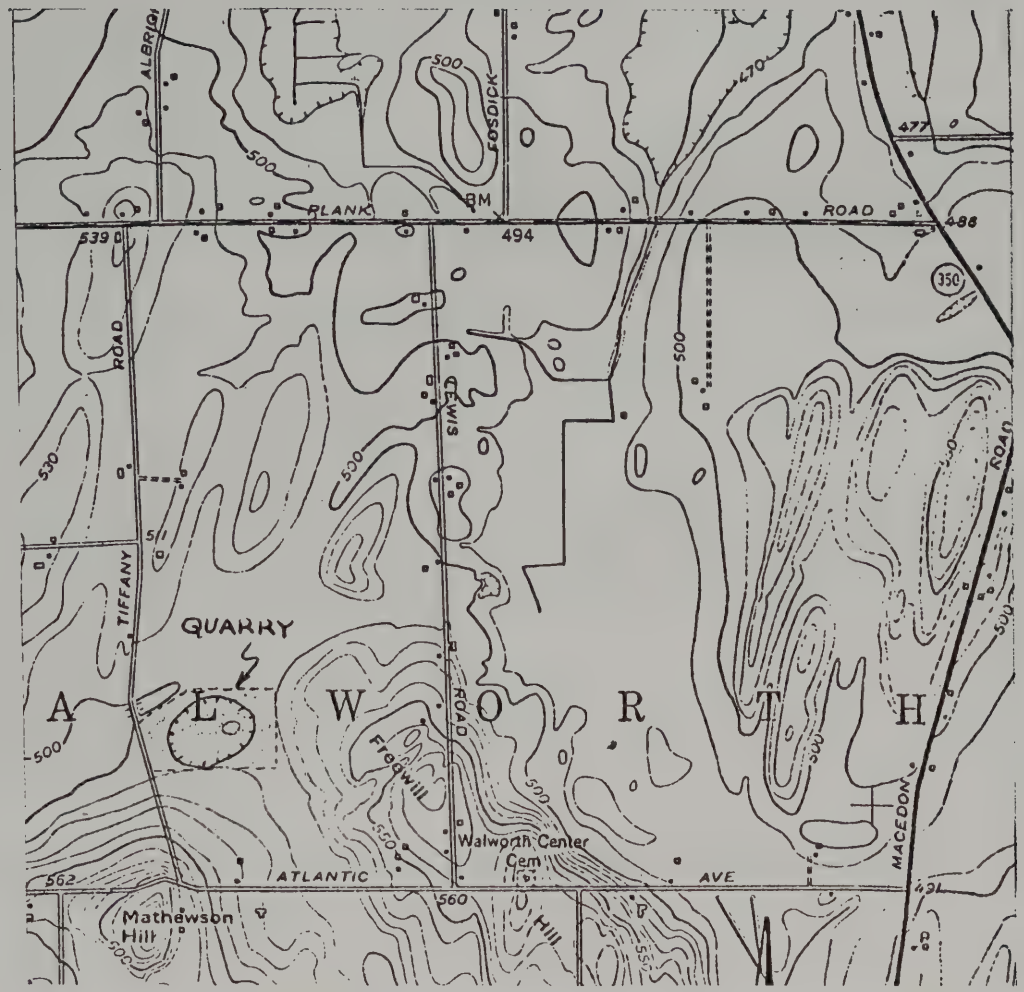


vertical scale: 1" = 20'

SOURCE NO: 3-8R TOWN: Walworth COUNTY: Wayne

SUPPLIER: Dolomite Products Co. U.S.G.S. LOCATION: 45-6-E-1

LOCATION MAP



QUADRANGLE: Ontario 7½'

51

SOURCE NO: 3-8R

SOURCE ACTIVE FOR NYSDOT: Yes

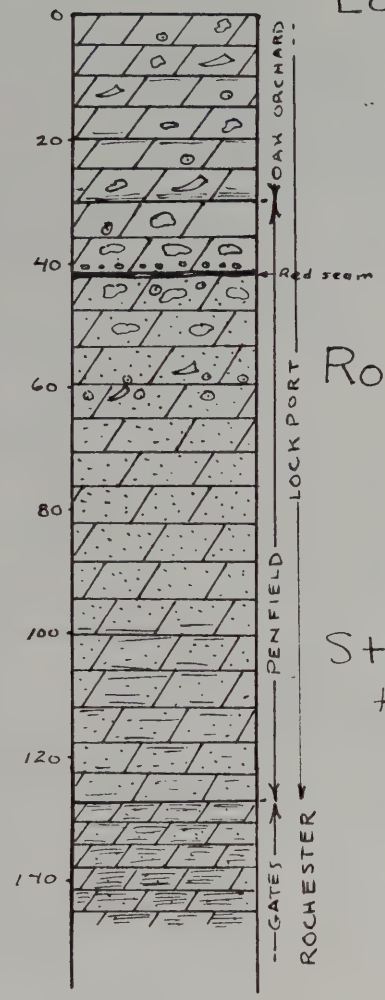
SUPPLIER: Dolomite Products Co.

QUARRY REPORTS ON FILE: Yes

TOWN: Walworth

COUNTY: Wayne

GEOLOGIC COLUMN



Lockport Formation:

Oak Orchard Member: Dolomite, dark to medium gray, slightly brown, fine to med. crystalline, occasional shaly partings, porous, vuggy and reefy, medium to thick bedded. Shaly just above basal contact.

Penfield Member: Dolomite, medium gray, fine to medium crystalline, dark shaly partings, thin laminated bedding, arenaceous - containing abundant quartz sand, vugs, particularly in the upper portion, lined with crystals, crinoid and coral fossils common, medium bedded. Red clay seam underlying a distinctive crinoid bed serves as a marker zone.

Rochester Formation:

Gates Member: Dolomite, medium to light gray, fine to medium grained, contains abundant quartz sand. Dolomite is interbedded with black shale that occurs as thin partings and beds up to ½" thick. Shale become more abundant with depth.

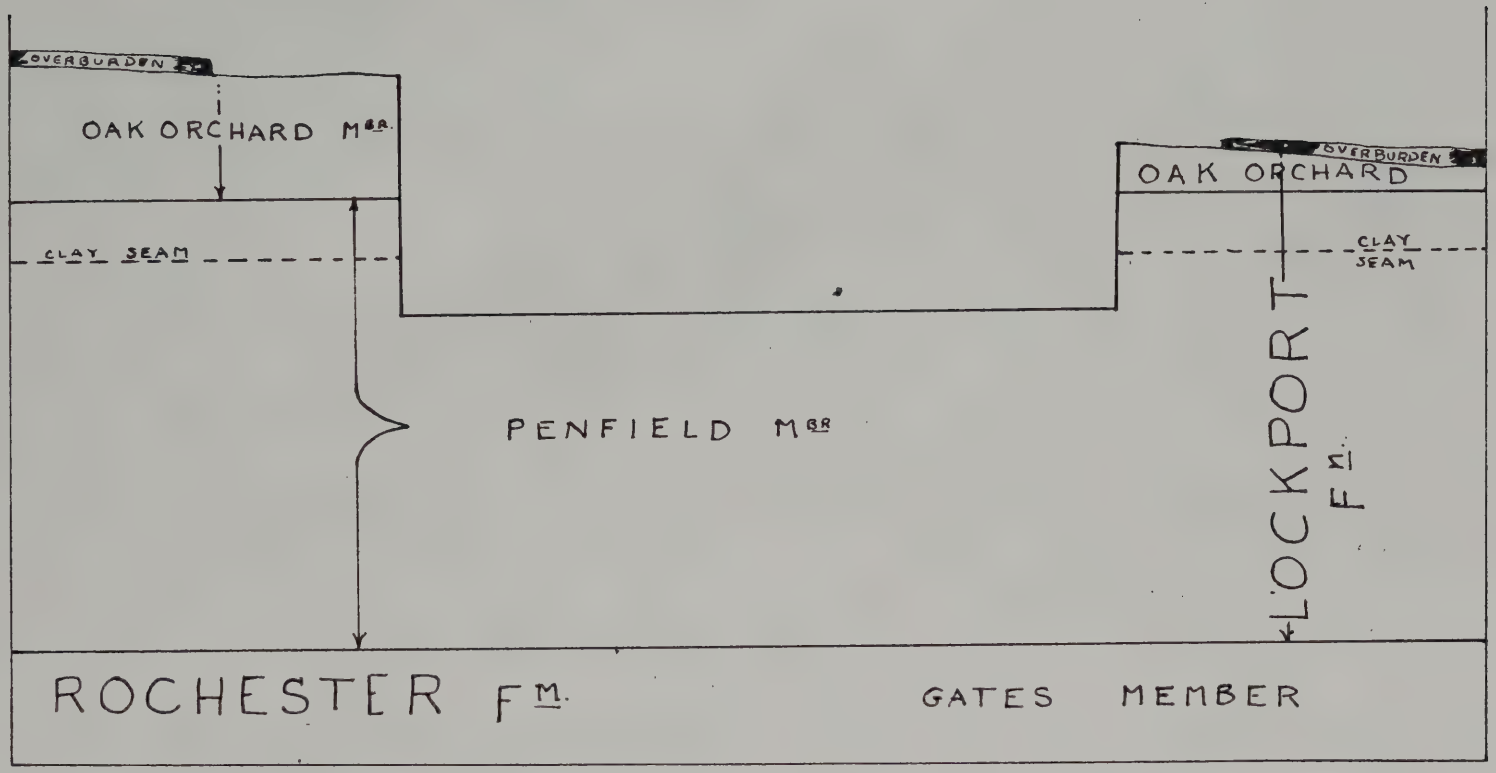
Structure: Beds are generally flat-lying and have a gentle regional to the south.

Stratigraphic description based on Lund.

SOURCE NO: 3-8R

SUPPLIER: Dolomite Products Co. TOWN: Walworth COUNTY: Wayne

GENERALIZED GEOLOGIC CROSS SECTION

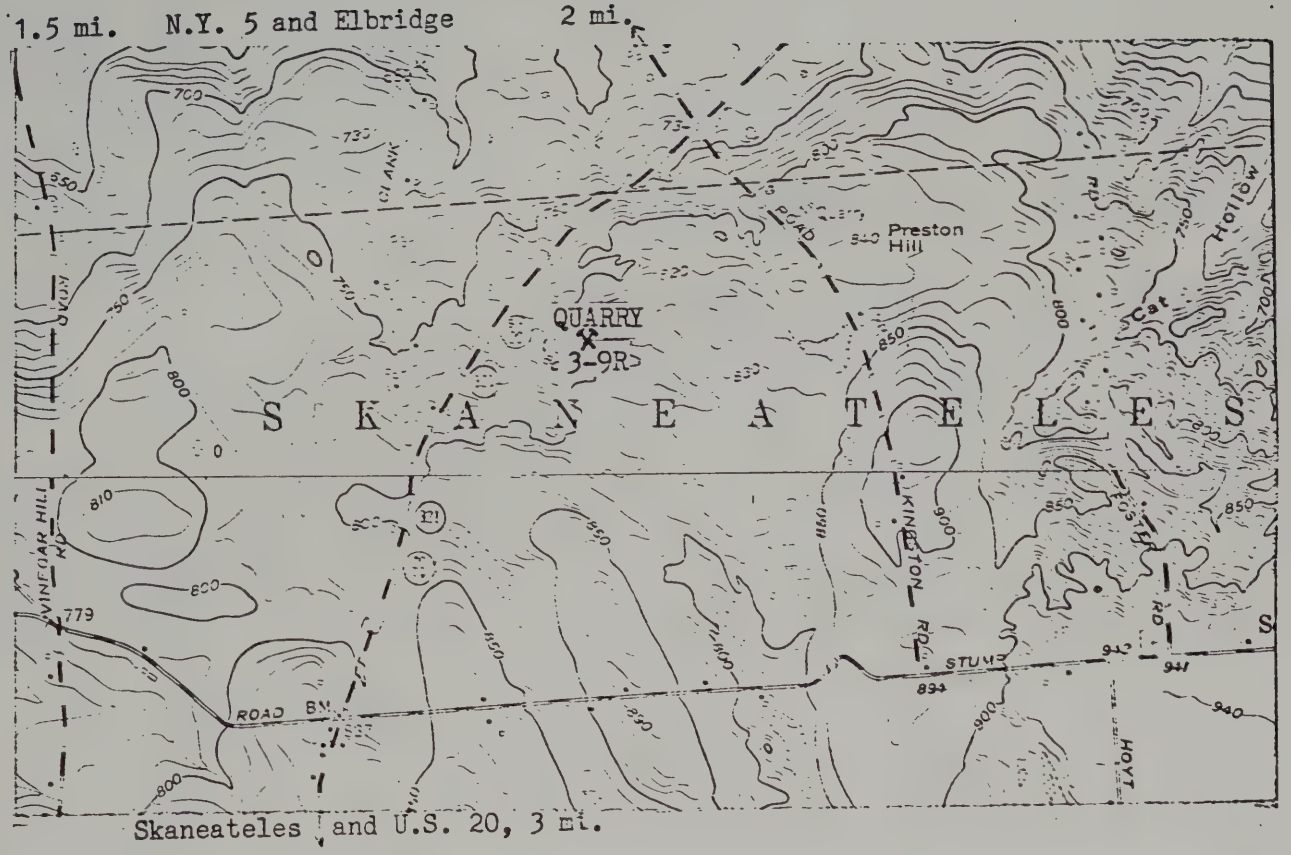


Vertical Scale: 1"=40'

SOURCE NO: 3-9R TOWN: Skaneateles COUNTY: Onondaga

SUPPLIER: General Crushed Stone Co. U.S.G.S. LOCATION: 73-2-C-1

LOCATION MAP



QUADRANGLE: Jordan 7½'

54

SOURCE NO: 3-9R

SOURCE ACTIVE FOR NYSDOT: Yes

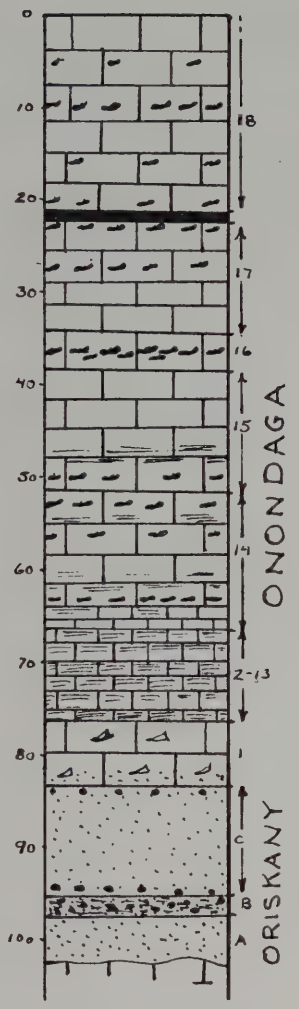
SUPPLIER: General Crushed Stone Co.

QUARRY REPORTS ON FILE: Yes

TOWN: Skaneateles

COUNTY: Onondaga

GEOLOGIC COLUMN



Onondaga Formation:

Seneca Member (Unit 18): Limestone, med. dark gray, fine grained, medium bedded some nodular chert zones.

Tioga Bentonite: Volcanic ash, light gray, clayey, soft, forms re entrants.

Moorehouse Member:

Unit 17: Limestone: dark gray, fine grained, nodular chert in layers, some fossils.
Unit 16: Limestone: dark gray, fine grained, cherty zone dominates the Unit.
Unit 15: Limestone: dark gray, fine grained, some chert, fossils, locally thin bedded, basal shale.
Unit 14: Limestone: dark gray, fine grained, abundant chert in upper portion and scattered throughout. Basal contact at a 5" zone of shale (MARKER BED)

Nedrow Member (Units 2-13): Limestone, dark gray, fine grained, argillaceous, thin bedded, occasional chert nodules, scattered pyrite that oxidizes on exposure.

Edgecliff Member (Unit 1): Limestone, light bluish gray, medium to coarse crystalline, fossiliferous throughout containing abundant corals, quartz sand in the limestone near the base.

Oriskany Formation:

Unit C: Sandstone, buff to light gray, medium grained, well cemented with lime and silica cement, dark phosphatic nodules at the base.

Unit B: Sandstone, dark gray, silty and shaly, posphatic nodules throughout, poorly cemented, disintegrates in the face.

Unit A: Sandstone, light gray to buff to orangish tan, medium grained, massive, very well cemented.

(Continued)

SOURCE NO: 3-9R

SOURCE ACTIVE FOR NYSDOT: Yes

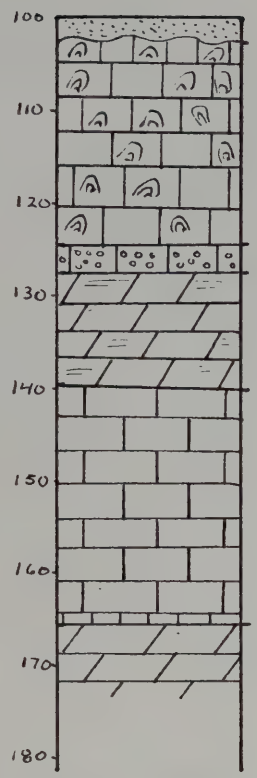
SUPPLIER: General Crushed Stone Co.

QUARRY REPORTS ON FILE: Yes

TOWN: Skaneateles

COUNTY: Onondaga

GEOLOGIC COLUMN



Manlius Formation:

Jamesville Member: Limestone, dark gray, fine grained, abundant stromatoporoids ("cabbage-head" reef fossils)

Clark Reservation Member: Limestone, medium to dark gray, massive, oolitic.

Elmwood Member: Dolomite, medium dark gray to buff, fine grained argillaceous, laminated.

Olney / Thacher Members: Limestone, medium to dark gray, medium to coarse crystalline, fossiliferous, medium bedded.

Rondout Formation: Dolomite

Structure: Rolling folds in the rock complicate the generally flat-lying nature of the beds.

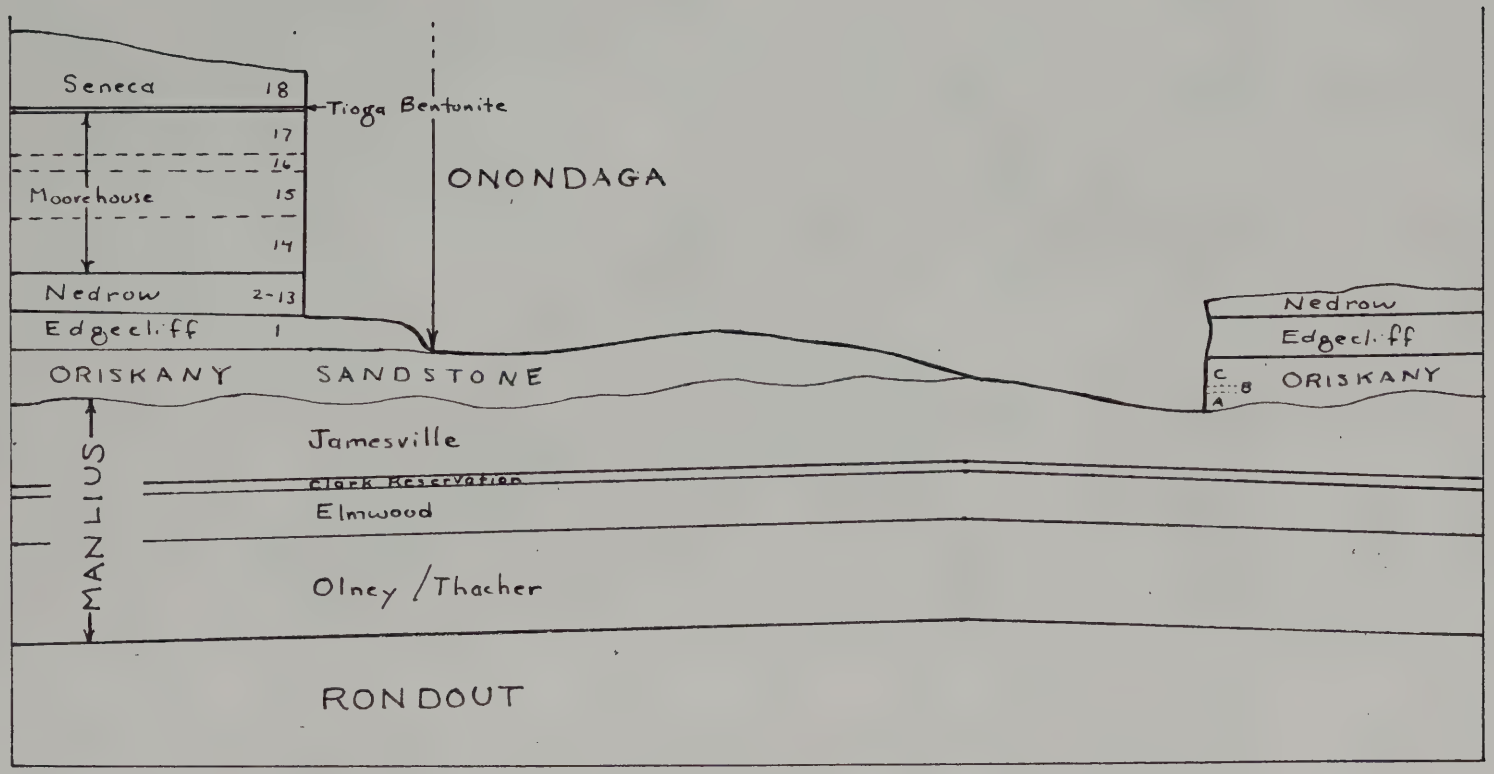
Potential Problems: The Nedrow tends to deteriorate over time but has not presented a problem up to now. The percentage of Oriskany Sandstone in the stockpile of mix must not exceed 30%.

Stratigraphic descriptions from Skerritt

SOURCE NO: 3-9R

SUPPLIER: General Crushed Stone TOWN: Skaneateles COUNTY: Onondaga

GENERALIZED GEOLOGIC CROSS SECTION

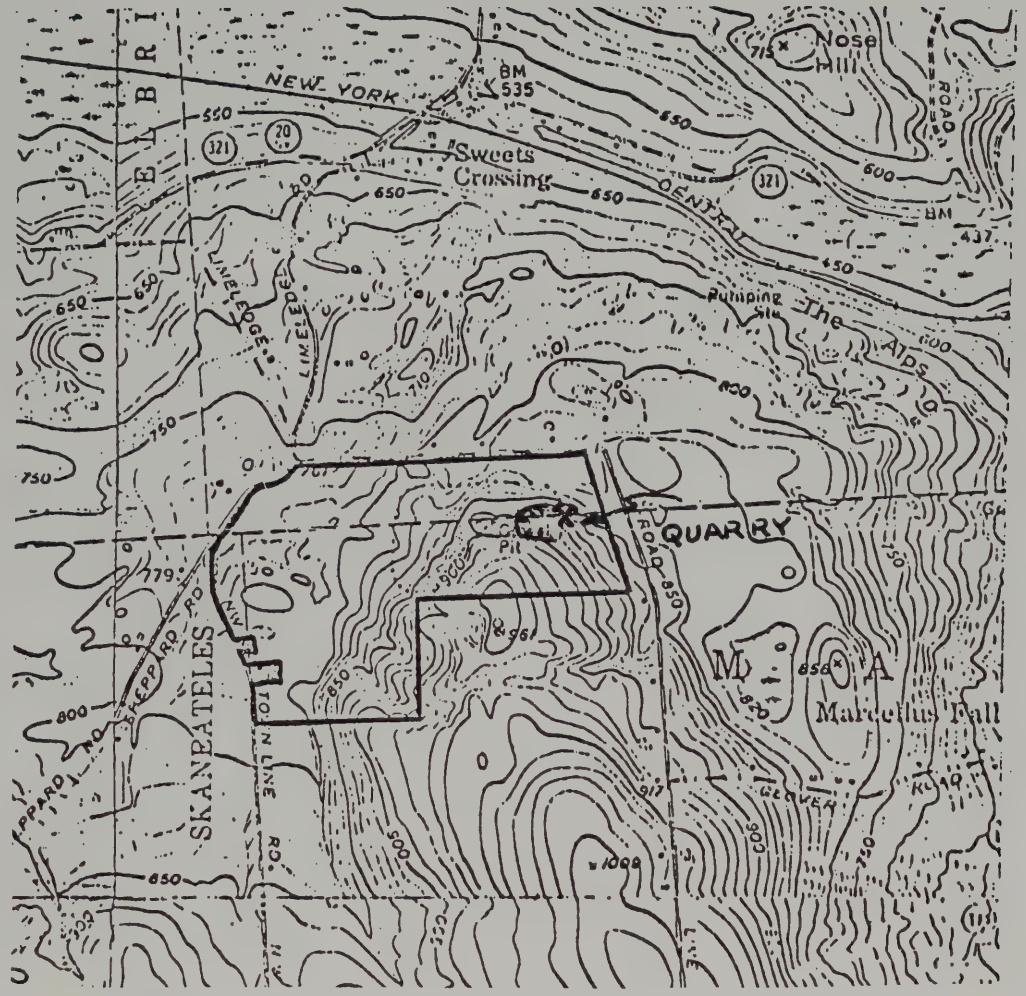


Vertical Scale: 1" = 50'

SOURCE NO: 3-10R TOWN: Marcellus COUNTY: Onondaga

SUPPLIER: W. F. Saunders & Sons, Inc U.S.G.S. LOCATION: 72-8-P-28

LOCATION MAP



QUADRANGLE: Jordan 7½'

58

SOURCE NO: 3-10R

SOURCE ACTIVE FOR NYSDOT: Yes

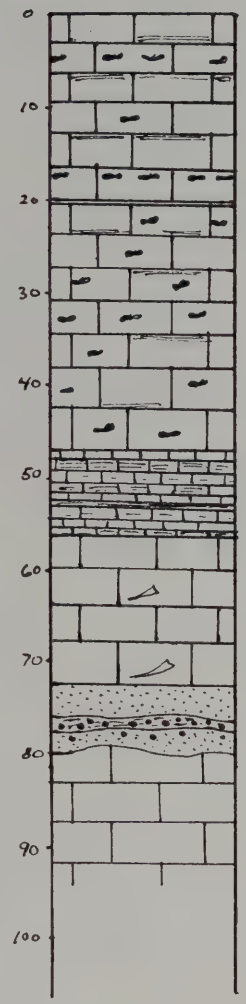
SUPPLIER: W.F. Saunders & Sons, Inc.

QUARRY REPORTS ON FILE: Yes

TOWN: Marcellus

COUNTY: Onondaga

GEOLOGIC COLUMN



Onondaga Formation:

Seneca Member: Limestone, dark gray, finely crystalline, scattered chert nodules, occasional shaly partings and mud seams.

Tioga Bentonite: clayey, plastic, uniform within a 2" seam

Moorehouse Member: Limestone, dark gray, finely crystalline, scattered chert nodules, subconchoidal fracture, occasional thin shale partings and inch seams

Nedrow Member: Limestone, medium gray, fine grained, thin bedded, shaly partings pyrite scattered throughout, argillaceous

Edgecliff Member: Limestone, medium gray, fine to medium crystalline, fossiliferous.

Oriskany Formation:

Horizon C: Sandstone, white, medium grained, very uniform.

Horizon B: Sandstone, dark gray, medium grained, abundant phosphatic nodules, some thin mud seams.

Horizon A: Sandstone, white, medium grained, black phosphatic nodules most abundant near the top, massive.

Manlius Formation:

Jamesville Member: Limestone, dark gray, finely crystalline, occasional mud seam.

Structure: Generally flay lying

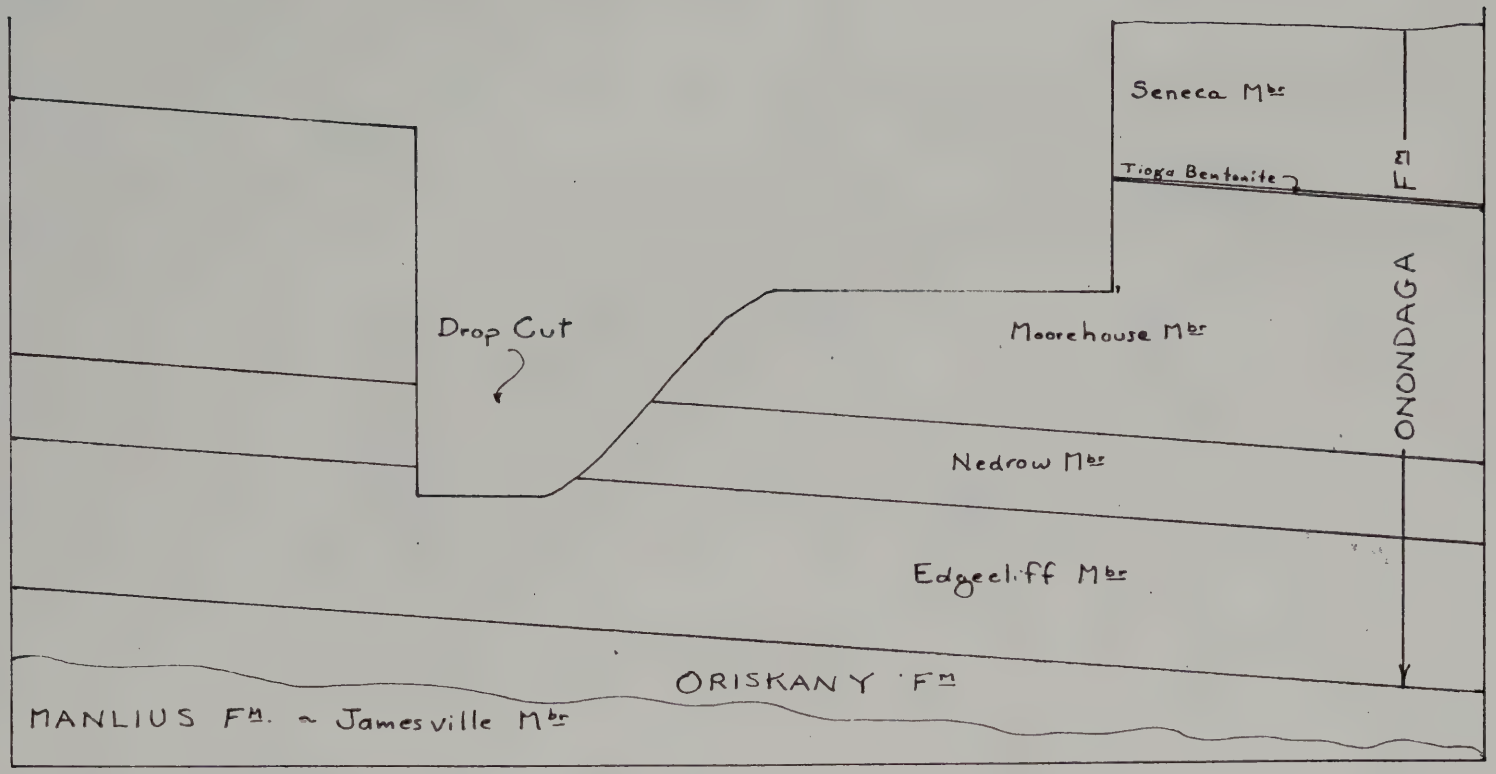
Potential Problems: The Nedrow could present a problem if it is included in the production. Boulders of limestone, common in the overburden, must b excluded from the production, they include Elmwood lithology (argill. dol.)

Stratigraphic descriptions based on Zasada

SOURCE NO: 3-10R

SUPPLIER: W.F. Saunders & Sons, Inc. TOWN: Marcellus COUNTY: Onondaga

GENERALIZED GEOLOGIC CROSS SECTION



SOURCE NO: 3-11R TOWN: Springport (Oakwood) COUNTY: Cayuga

SUPPLIER: General Crushed Stone Co. U.S.G.S. LOCATION: 64-A-28-F

LOCATION MAP

QUADRANGLE: Cayuga

SOURCE NO: 3-11R

SOURCE ACTIVE FOR NYSDOT: No

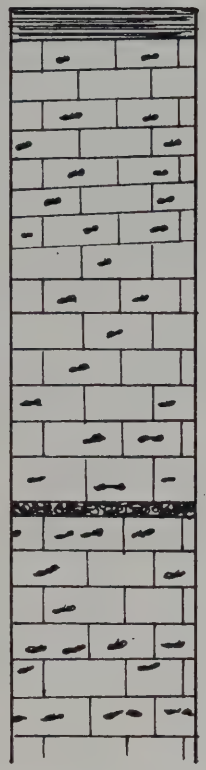
SUPPLIER: General Crushed Stone Co.

QUARRY REPORTS ON FILE: No

TOWN: Springport (Oakwood)

COUNTY: Cayuga

GEOLOGIC COLUMN



Marcellus Formation:

Union Springs Member: Shale, Black, fissil

Onondaga Formation:

Seneca Member: Limestone, medium dark gray, finely crystalline, nodular chert

Tioga Bentonite: Clay, tan and gray, mixed with broken limestone fragments.

Moorehouse Member: Limestone, medium dark gray, finely crystalline, nodular chert in zones.

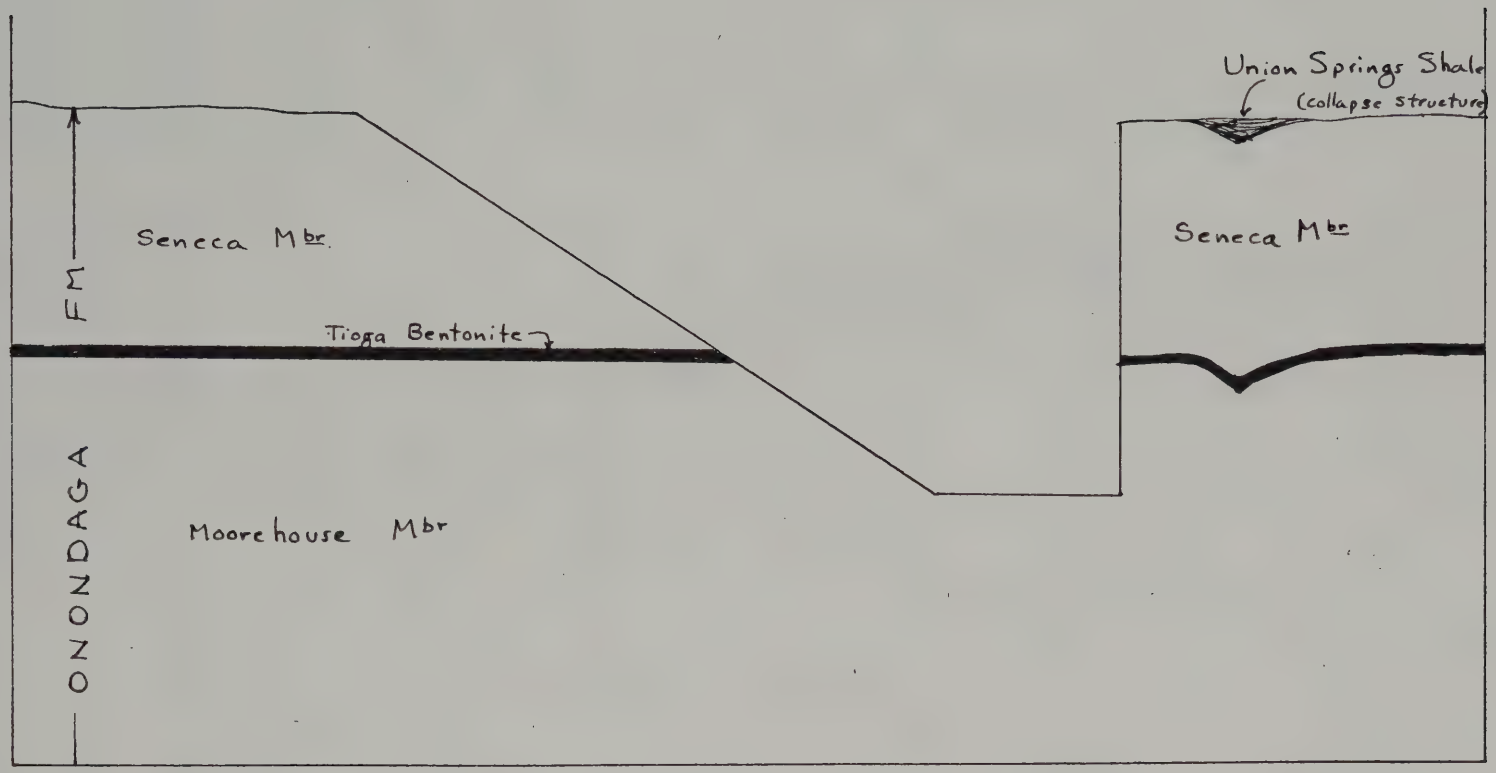
Structure: Generally flat-lying but with rolls in the beds and occasional collapse structures. Prominent joint pattern.

Potential Problems: clay derived from the Tioga Bentonite can show up in the stockpiles. Because the top of the face is so close to the Union Shale, when collapse structures are encountered the shale is often found included at the top of the structure. Silt is a potential problem due to the well developed joint system.

SOURCE NO: 3-11R

SUPPLIER: General Crushed Stone Co. TOWN: Springport (Oakwood) COUNTY: Cayuga

GENERALIZED GEOLOGIC CROSS SECTION



vertical scale : 1" = 20'

GLOSSARY

Anticline - An arch of stratified rock in which the beds slope downward in opposite directions from the crest.

Arenaceous - A term applied to rocks which contain sand and have a sandy texture.

Argillaceous - A rock which contains an appreciable amount of clayey material disseminated throughout the rock and not concentrated in beds.

Argillite - A metamorphic rock derived from shale.

Bedding - The smallest division of a stratified rock which is separated from adjacent layers by more or less well-defined divisional planes. (Synonymous with stratification)

Bentonite - A rock made up almost entirely of the clay mineral, montmorillonite, commonly formed by the alteration of volcanic ash.

Calcarenite - A limestone having a sandy texture but made up of fossil fragments.

Chert - A light-colored rock composed of silica which may be amorphous or made up of grains microscopic or submicroscopic in size. The dark-colored variety is known as flint.

Conchoidal - The term used to describe curved fracture surfaces.

Coquina - A limestone that is coarse grained and porous and made up chiefly of shells and shell fragments cemented together.

Crinoid Stems - The fossilized stems of ancient sea lilies.

Dike - A tabular body of igneous rock formed by the hardening of molten rock which has risen in a crack or fissure.

Dip - The angle which a stratum, bed, or other planar structure in rock makes with a horizontal plane.

Dolomite - A bedded sedimentary rock made up chiefly of the mineral, dolomite ($CaMg(CO_3)_2$).

Epidote - A yellowish-green mineral which occurs in granular or massive form.

Fault - A break in the continuity of a body of rock along which there has been relative movement.

Fissility - A term commonly applied to any sedimentary rock (usually shale) which can be split along any plane parallel to the bedding.

Formation - A large and persistent unit of one kind of rock or rocks which have one or more characteristics in common, and which can be identified throughout an appreciable area.

Fossil - The remains or evidence of the remains of an animal or plant of past geological ages which has been preserved in the earth's crust.

Gneiss - A metamorphic crystalline rock whose minerals are arranged in more or less distinctive bands or layers.

Granite - A massive igneous rock of various colors, composed chiefly of feldspar and quartz with a uniform grain size that is visible to the unaided eye.

Graywacke - A name applied chiefly to a dark colored variety of sandstone which is made up of fragments of rocks i.e., slate, phyllite, etc. in addition to grains of minerals such as quartz and feldspar.

Horizon - A plane in rock strata characterized by particular features, as the occurrence of distinctive fossil species.

Joints - Natural fractures in rocks which usually are parallel, or nearly so, and along which rock is separated into blocks.

Lamination - Thin layering of bedding usually less than 1 centimeter in thickness in a sedimentary rock.

Limestone - A bedded sedimentary rock made up chiefly of the mineral calcite ($CaCO_3$).

Lithographic Limestone - Extremely fine grained limestone such as is used in lithography.

Lithologic similarity - Similarity of various rock units with regard to physical and chemical characteristics.

Marker bed - A lithologic unit that is so distinctive that it is used for stratigraphic reference.

Massive - Occurring in thick beds, bands, or layers free from minor laminations.

Member - A division of a formation, generally of distinct lithologic character and considerable geographic extent.

Metamorphism - Natural geologic processes, often accompanied by sustained high pressure and temperature, which transform the chemistry and the structure of pre-existing rocks and minerals.

Metasediments - Any metamorphic rocks derived from original sediments or sedimentary rocks.

Ore - A mineral, having a premium value, mixed more or less with gangue.

Outcrop - A portion of a stratum of rock exposed on the surface of the earth.

Pegmatite - An very coarse crystalline granite.

Phytopsis - The fossiliferous remains of vertical tubes, formed by marine worms, which have become filled with the mineral, calcite.

Quartzite - A hard and abrasive glassy-appearing rock made up almost entirely of quartz.

Sandstone - A sedimentary rock composed predominantly of quartz grains of sand size which are cemented together.

Shale - A sedimentary rock consisting of more or less hardened fine muds.

Siltstone - A sedimentary rock composed predominantly of quartz grains of silt size (minus #200 sieve).

Sink Hole - A vertical hole in limestone worn by water percolating along a joint or fissure.

Stromatopora - A coral fossil with the shape and internal structure of a cabbage head.

Sucrosic - Having the texture of granulated sugar.

Tailings - The rock material produced as an by-product of ore processing.

Vug - A cavity in rock, often lined with crystals.

Waterlime - A sedimentary rock that is argillaceous or clay-rich dolomite and is generally wet/dry and freeze/thaw sensitive.

Weathering - All physical and chemical changes produced in rocks at or near the surface which result in more or less complete disintegration and decomposition.

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